An Roinn Tailte

(Department of Lands)

FO-ROINN IASCAIGH

(Fisheries Division)

REPORT

ON THE

SEA AND INLAND FISHERIES

FOR THE YEAR

1959,

incorporating Statistics of the Capture of Salmon, Sea Trout and Eels, and certain scientific papers relating to fisheries.

DUBLIN:
PUBLISHED BY THE STATIONERY OFFICE.

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NOTE :—Sea fish are divided into two categories, pelagic and demersal. The term "pelagic" (Greek : "pelagos", the sea) is applied to those fish which usually swim at or near the surface of the water. The main varieties of pelagic fish landed are herrings, mackerel and sprats. The term "demersal" (Latin : "Demergere", to plunge down) is applied to those fish which live during adult life at or near the sea bottom. The chief species landed are turbot, brill, soles, plaice, cod, haddock, hake, ling, whiting, conger eel and ray (skate). Shellfish consist of two classes, viz., molluscs, of which the main varieties gathered are periwinkles, mussels, oysters, escallops and cockles, and crustaceans—lobsters, crawfish, Norway lobsters (or Dublin Bay prawns) and crabs.

REPORT

OF THE

MINISTER FOR LANDS

ON THE

SEA AND INLAND FISHERIES

FOR THE YEAR

1959

PART I

SEA FISHERIES

The landings of sea fish in 1959 were greater both in quantity and value than in 1958. The total quantity (excluding shellfish) was 592,319 cwt. as compared with 547,377 cwt. in 1958 and the value was £1,205,971 in 1959 as compared with £1,025,505 in 1958. For these two years, the value of shellfish was £402,716 and £291,255 respectively. The total earnings of the sea fishing industry, therefore, came to £1,608,687 in 1959 representing an increase of £291,927, or over 22% on the 1958 figure of £1,316,760. Of this increase, demersal fish contributed £83,392, pelagic fish £97,074 and shellfish £111,461. The following Table gives the weight and value of the landings of all sea fish (excluding shellfish) since 1950 :—

TABLE 1.

Year		Cwt.	£
1959	..	592,319	1,205,971
1958	..	547,377	1,025,505
1957	..	532,475	907,119
1956	..	377,367	787,160
1955	..	303,519	686,195
1954	..	254,714	635,802
1953	..	222,516	545,105
1952	..	203,000	478,774
1951	..	187,645	431,875
1950	..	214,236	442,309

Particulars of the varieties landed in 1959 are to be found in Appendix 1 and the average prices for each variety in the years from 1952 to 1959 are shown in Appendix 2. The weather throughout most of the summer and autumn of 1959 was fine and this factor no doubt contributed to the favourable results recorded. Imports of demersal fish, mainly the prime varieties, were, however, required at times to fill temporary shortages and licences were issued as occasion demanded.

As traders had represented that plaice in particular was frequently in rather short supply, imports of this variety were permitted more liberally than hitherto. Imports of herring were allowed as usual when supplies were not available from home sources.

In order of value of fish landed, the principal ports in 1959 were Dunmore East, Killybegs, Howth, Galway, Castletownbere, Dingle and Burtonport.

DEMERSAL FISHERY.—The quantity of demersal fish landed in 1959 was very slightly less than in 1958 but the value was considerably higher. The figures are respectively—258,178 cwt. and 258,978 cwt. with the values £800,698 and £717,306. The pattern of the landings by variety was strikingly similar in both years, the only variety in which any difference of consequence appears being haddock, of which there was a reduction of over 9,000 cwt. or 32% compared with 1958. Whiting was, as usual, taken in the greatest quantity by far, ray and skate came next, followed by cod, plaice and haddock in that order. Whiting, although its unit value is lowest among the demersal varieties, also had the highest aggregate value ; plaice was second, followed by cod, ray or skate and haddock.

The demand for demersal fish is gradually improving as the average price figure tends to show. In 1959 increasing demand meant better returns to the fishermen for approximately the same quantity as was on offer in 1958. Higher unit prices for larger quantities of whiting curtailed the operations of quick-freezing plants and the drop in haddock supplies also had its effect. It has come to be the accepted position that prime fish is a scarce commodity and its price reflects the very good demand which awaits satisfaction. This situation should lead to increased effort on the part of all sections of the industry to make increased supplies of prime fish available. It is encouraging to note that distribution in provincial areas is growing wider, helped by the activities of quick-freezing concerns and the further development of this branch of the industry augurs well for the continuation of satisfactory returns to the fishermen. It is, however, essential to the expansion of the fish-processing industries that regular and adequate supplies of the different varieties be available at realistic prices if these industries are to expand to supply home and export markets.

Direct distribution of fresh fish from landing ports has also helped to improve fish consumption in inland areas but the main difficulty in this trade is the lack of variety at each port at any given time. Transport charges for fresh fish from coastal centres to inland towns also have a bearing on the growth of trade with country districts.

As in 1958, the most widespread method used in the capture of demersal fish was the Danish seine net but the high cost of rope tends to reduce its popularity. Trawling with vinge trawls manufactured of synthetic fibres is increasing. In some ports these trawls are being used as seines and have proved very successful in operation. They are normally much more costly than seines but they outlast seine nets and do not need the same care.

The following table shows quantity, total value and average value per cwt. of demersal fish for each of the past ten years.

TABLE 2.

Year	Cwt.	£	Average value per cwt.
			s. d.
1959 ..	258,178	800,698	62 0
1958 ..	258,978	717,306	55 5
1957 ..	259,722	693,330	53 5
1956 ..	225,488	660,674	58 7
1955 ..	193,916	593,190	61 2
1954 ..	169,926	540,690	63 7
1953 ..	147,757	451,901	61 2
1952 ..	134,841	397,276	58 11
1951 ..	119,055	354,536	59 7
1950 ..	119,645	364,702	61 0

PELAGIC FISHERY.—*Herrings* :—The improvement in herring landings which commenced in 1955 continued in 1959 with an increase of about 22% in quantity and 35% in value over 1958. The two main centres were again Dunmore East, with 62% of the landings, and Co. Donegal with 25%. The demand for Irish herring during the winter seasons is still very buoyant and is reflected in the improved landing value figures. The average price per cwt. for herring landed in 1959 at 23/8d. was the highest price per cwt. realised since 1953 when the total catch was less than one-fifth of that for 1959.

Dunmore East maintained its position as the port handling the greatest value of fish, due solely to its winter herring fishery. During the first three months of 1959, landings were again greater than in the corresponding period of 1958 and were mainly made by ringers and trawlers. Seine netting is being replaced by mid-water and bottom trawling as the most satisfactory method of towing for herring. Ring net fishing was consistently good throughout this period. In the last three months of the year, the improvement over 1958 was continued and ringers provided the major share of the catch. Catches by trawlers showed a gradual increase from November to December and there were more boats using this gear at the end of the year than there were in 1958. The use of seine nets for herring fishing ceased completely by the end of 1959. As in 1958, continental herring fleets were very active off the coast and are believed to have had successful fishing.

English and Dutch markets took the bulk of the herring landings, the English consignments being transported by sea and rail while regular trips by Dutch luggers transferred the Dutch purchases. Export of frozen and marinated herring by sea to Germany commenced towards the end of the year and prospects are good for continuation of this trade.

Herring fishing off the Donegal Coast in January, 1959, when the 1958/59 winter season closed, was good. Spent herring fishing at Killybegs failed again during the autumn and boats were at a considerable loss in searching for the shoals at that time. Further catches of herring of any consequence were not made until October when the 1959/60 season opened. Off the Donegal Coast, the 1959 catch was approximately the same (77,800 cwt.) in quantity as that taken in 1958 (77,500 cwt.) but the value at £84,500 was just 17% higher in 1959. Freshing, mainly to Cross-channel centres, freezing and marinating for the American and Continental trade accounted for the bulk of the catch.

Landings at Bunbeg of first-class full herring were very slightly above those in 1958 but the value increased by approximately 18%. Burtonport and Kincasslagh, however, showed decreased catches, though again values were slightly higher.

Ring nets provided the bulk of the herring at Killybegs, Burtonport and Kincasslagh while the traditional drift netting from yawls accounted for all the Bunbeg fish and for a small share of the landings at the other West Donegal ports.

Winter herring landings on Achill Island were greater than in 1958 but quality was not consistently good though some were bought for freezing and marinating.

It seems apparent that rough packing herring, for further processing abroad, and marinating are superseding the traditional Scotch cure in this country. There were four firms marinating in 1959 as against two in 1958 and the quantities rough packed showed an increase while the quantities cured dropped appreciably. The ruling high prices obtained by the fishermen during the year precluded the full operation of processing industries which could handle large quantities of herring. Considerably increased landings selling at a reasonable unit price would be the solution.

The following Table shows the quantity, total value and average value per cwt. of herring landings since 1950 :—

TABLE 3.

Year	Cwt.	£	Average value per cwt.
			s. d.
1959 ..	308,064	364,130	23 8
1958 ..	262,759	268,579	21 3
1957 ..	233,365	173,027	14 10
1956 ..	137,849	101,608	14 9
1955 ..	96,560	73,782	15 3
1954 ..	68,322	72,848	21 4
1953 ..	58,981	70,066	23 9
1952 ..	54,947	60,451	22 0
1951 ..	49,823	56,830	22 10
1950 ..	67,840	55,438	16 4

Pilchards :—There were many reports of pilchards off the Donegal Coast during summer and autumn but only in Sheephaven was any real effort made to land them. The fish was sold to Killybegs and Ardglass fish meal factories. A few shots of pilchards were also landed at Burtonport at the same period. In all, about 5,000 cran were taken. (These are included under the heading of herrings in Appendix No. 1.)

Mackerel :—Landings of mackerel have been at a low level for a number of years and in 1959 they were less than in 1958 although somewhat higher than in 1957. The 1959 figure was 25,645 cwt. as against 35,490 in 1958. The value, however, was slightly greater at £40,978 as against £39,570 in 1958. This variety is not fished as extensively as it might be and landings of any consequence are confined to West Cork and Kerry. The quantity, total value and average unit value for the past 10 years are given hereunder :—

TABLE 4.

Year	Cwt.	£	Average value per cwt.
			s. d.
1959 ..	25,645	40,978	31 11
1958 ..	35,490	39,570	22 4
1957 ..	22,913	36,209	31 7
1956 ..	13,850	24,815	35 10
1955 ..	11,563	18,913	32 9
1954 ..	14,766	21,967	29 9
1953 ..	15,374	22,976	29 11
1952 ..	13,018	20,967	32 3
1951 ..	17,017	19,959	23 5
1950 ..	19,838	20,399	20 7

SHELLFISH. — Takings of shellfish have come to figure more and more prominently each year in the total value of the sea-fishing catches. Again in 1959 there was an appreciable increase compared with the previous year, the figure returned being £402,716 as compared with £291,255 in 1958. Lobsters and crawfish were, as usual, the main varieties taken and, combined, they accounted for about 70% of the total value of shellfish. Norway lobster, which are being taken in increasing quantities year by year, attained third place in the value of shellfish — £48,425 as compared with £36,257 in 1958. Next in value were periwinkles at £40,112 compared with £38,231 the previous year. Oysters, mussels, escallops, crabs and other shellfish made up the balance. There is a steady export market for all varieties of shellfish. Formerly the takings of lobsters and crawfish were confined mostly to the smaller type of vessel which operated intermittently but in recent years some of the bigger boats have found it profitable

to engage in catching these varieties. The value of shell fish landings over the past 10 years was as follows :—

TABLE 5.

Year	£
1959 ..	402,716
1958 ..	291,255
1957 ..	239,968
1956 ..	233,634
1955 ..	196,103
1954 ..	154,525
1953 ..	142,554
1952 ..	124,196
1951 ..	93,604
1950 ..	87,119

PERSONNEL AND VESSELS.—In 1959 there were 6,173 persons listed as engaged in the sea-fishing industry of whom 1,771 were whole-time and 4,402 were part-time. The total represents a drop of 42 persons on that for the previous year. It is significant, however, that the figure for whole-time employment at 1,771 is higher by 84 than in 1958, indicating as it does the continued trend towards the acquisition of larger type boats for whole-time fishing. The comparative figures for boats engaged in fishing are 2,308 in 1959 as against 2,470 in 1958. Corresponding to the number of men engaged in whole-time fishing, the number of vessels of 25 tons gross and over rose from 142 in 1958 to 194 in 1959.

TRAINING OF FISHERMEN.—The chief obstacle to development of the fishing industry continues to be lack of trained men. A scheme for training competent fishermen as skippers was continued during the year and a scheme for training boys as fishermen was inaugurated. Candidates for training as skippers were required to be not less than twenty years of age and to have had at least three years' sea-fishing experience. Each course consisted of twenty weeks' practical training on board a fishing vessel and twenty weeks' theoretical training at the Town of Galway Vocational School. Allowances were paid to the trainees. The seven trainees who were attending the Town of Galway Vocational School at the end of the previous year completed their course and were awarded certificates of competency under the Merchant Shipping Acts. The response to the scheme in 1959 was disappointing, only three suitable candidates applying. These, together with three trainees who had not completed their practical training at the close of the previous year, were attending the Town of Galway Vocational School at the end of 1959. Further courses were announced in December and arrangements were made to interview applicants early in 1960.

For admission under the scheme for training boys as fishermen, applicants were required to be not less than sixteen years of age. Previous sea-fishing experience was not necessary. Boys are assigned

for training on selected fishing boats. Allowances are payable for a period of not more than two years to a learner undergoing training on a fishing boat. A boy being trained as an engineman who had made satisfactory progress would, after not more than two years on a fishing boat, be given further training ashore and his allowance would continue for an additional period of not more than six months. The response to this scheme for boys was satisfactory and a notable feature was the interest shown by those from outside the usual fishing areas. Ten boys were assigned for training but one withdrew. Arrangements were in hand at the end of the year for placing other suitable boys.

AN BORD IASCAIGH MHARA.—The Seventh Annual Report and Accounts of the Board covered the twelve months ended 31st March, 1959. The main features of the Board's activities as recorded in the Report were as follows :

Nine new boats (two of 56½ feet and seven of 50 feet) were issued on hire purchase terms during the year. Issues of boats and gear on hire purchase, credit or cash sales were valued at £169,479. The number of motor fishing boats the subject of hire purchase transactions at 31st March, 1959, was 111, valued at £740,673 at time of issue.

A fifth 56½ foot boat and four 26-foot boats were issued under the scheme for the provision of fishing boats in the Gaeltacht. Four 19-foot boats were also constructed for issue under this scheme but had not been put into commission at the close of the year.

One 56½ foot boat originally intended for exploratory and demonstration fishing was also put into commission.

Of the boats provided, twelve were constructed in the Board's own yards and six were supplied to the Board by other yards.

As from the 1st April, 1959, improved facilities for the purchase of new fishing boats through An Bord Iascaigh Mhara were introduced. These facilities include the following :—

(1) The cost of boats is reduced by 15% by means of grants from the Exchequer ;

(2) The rate of interest payable by hire purchasers is reduced by Exchequer subvention to 4% and

(3) The deposit payable by fishermen may, in exceptional cases, be reduced to 5%.

Following on the granting of permission to hire-purchasers to sell their catches through approved auctioneers the quantity of fresh sea-fish (excluding shellfish and imported white fish) handled by the Board during the year was 188,430 cwt. valued at £588,040 as compared with 216,681 cwt. valued at £565,683 in the previous year. Auctioning and wholesaling of fresh fish showed a profit of £825. Mussels treated on a fee basis at Cromane totalled 16,477 cwt. as compared with 18,936 cwt. in the previous year.

The Board's three offshore vessels continued fishing during the year. The total quantity of fish landed by them was 10,331 cwt. which after deduction of marketing expenses realised £36,905. There was an operational loss of £7,381 on the vessels to which were added administrative charges (£3,489), Exchequer interest (£4,444) and

depreciation (£5,676) making a total loss of £20,990 compared with £18,674 for the previous year.

The three fish-processing stations provided by the Board at Killybegs, Galway and Schull continued to be hampered by lack of supplies.

The production at the Killybegs factory during the year was as follows :

	Cwt.
Marinated herrings	3,212
Frozen fish	2,067
Smoked fish	1,812
Salt cured herrings	307
Fish Meal	2,829
Fish Oil	344
Ice	1,790

Operations at the Galway factory were further curtailed by a machinery breakdown.

The operational loss at Killybegs, Galway and Schull was £7,103 to which were added administrative charges (£6,954), Exchequer interest (£2,904) and depreciation (£4,186) making a total loss of £21,147.

The manufacture of ice was undertaken at Ballycotton, Cleggan, Dingle, Dunmore East, Galway, Murrisk, Killybegs and Schull. Demand for ice was considerably lower than the productive capacity of the plants but is slowly increasing.

During the year the Board received a grant of £42,980 from the Exchequer in aid of administration. Grants totalling £25,201 (£22,030 from Fisheries Vote and £3,171 from the National Development Fund—excluding the Gaeltacht Boat Scheme) were also made to the Board for capital development purposes. Advances to the Board from the Central Fund amounted to £36,836 for capital works and £130,335 for boats and gear.

SEA FISHERIES PROTECTION.—The protection of the exclusive fishery limits is undertaken by the Naval Service of the Department of Defence. During the year regular patrols were maintained over the coastal areas and seven vessels of extern nationality were arrested for infringing the limits. Convictions were secured and fines imposed in all cases while in six instances the fish and gear were forfeited. The Garda Síochána as usual assisted in the proceedings against the skippers of these vessels and also in the enforcement of fishery provisions generally.

MARINE WORKS.—Investigations were conducted during the year into proposals received for State aid towards the construction and improvement of fishery piers, slips, navigation beacons, etc., and for the dredging of fishery harbours. The Office of Public Works, the Special Employment Schemes Office and Local Authorities collaborate in the execution of works of this kind and in their subsequent maintenance.

Towards the end of the year, the Swedish consultant who had been appointed to advise on the development of a limited number of major fishery harbours, completed his assignment.

SCIENTIFIC INVESTIGATIONS (MARINE).—Samples of lobsters from Dalkey, Co. Dublin, and Kilmore Quay, Co. Wexford, were examined during the year. In March, 1959, 136 lobsters, nearly all of which were under 1½ lb. in weight, were tagged, tail-punched and liberated on to the Dalkey fishing grounds. By the end of the 1959 fishing season, 39 of these fish had been recaptured, of which 24 had moulted once between the time of liberation and recapture. The increase in length during this time varied between 5% and 11% and the increase in weight after moulting was from 25% to 35%. A total of 750 undersized (i.e. under 9 inches) lobsters were tail-punched and liberated into the Kilmore Quay fishery. The purpose of this experiment was to study the rate of growth at moulting in the smaller lobsters.

During July, August and September five different types of lobster pots were fished in competition at Kilmore Quay. The local Kilmore Quay pots yielded slightly more lobsters per 100 hauls than the Scottish creels which in turn outfished the other gears. French crawfish creels fished continuously in the Kilmore Quay area yielded appreciable quantities of crawfish.

Samples of Norway Lobster or Dublin Bay Prawns (*Nephrops norvegica*) from Irish waters were examined monthly during the year, special attention being paid to the length distribution, the sex ratio and the occurrence of egg-bearing females. Data was also compiled on the meat ratio of the various sizes of prawns landed. Progress reports upon the work on lobsters and nephrops were prepared and presented by one of the Inspectors to the Shellfish Committee of the International Council for the Exploration of the Sea at its meeting in Copenhagen in October, 1959. This officer also read to the Committee an account of a high density storage unit for lobsters which he had designed. This unit was described in Appendix 25 to the report for 1958.

One of the Assistant Inspectors successfully carried out experiments on the rehabilitation of a disused mussel bed in Carlingford Lough, during which it was shown that a great improvement in the quality of the mussel-meat resulted from clearing the beds by dragging a harrow behind a small power boat. Samples of mussels were also examined from many areas for the incidence of *Mytilicola intestinalis*, which has been reported from many areas in Europe in recent years. No new records for the occurrence of this parasite were made.

During the 1959/'60 herring season at Dunmore East, two of the Assistant Inspectors carried out a full investigation of the herrings landed at that port. Samples of herrings were obtained regularly and scales and otoliths were taken for age determinations. In an endeavour to locate small herrings along the Irish coast, arrangements were made to examine the catches of small fish in so-called "sprat weirs" in Waterford Harbour near Passage East and at Ballynatray near Youghal in the estuary of the Blackwater. Catch and effort statistics

for the Dunmore East fishery were also compiled during the season. A report upon this fishery by one of the Department's staff is printed as Appendix 26.

A Working Group on the Dunmore East herring fishery was established by the Herring Committee of the International Council for the Exploration of the Sea at the Copenhagen meeting in 1959 and the Department's staff collaborated with other members of the Group from Great Britain, Germany and The Netherlands in compiling scientific information on this fishery.

Towards the close of 1959, scientific work was commenced on the whiting off the Irish coasts, particularly from the Irish Sea. Whiting from commercial catches were examined regularly and market sizes were established for some of the more important landing places.

During the year some fishes rare or scarce to Irish waters were recorded. A specimen of the file or trigger fish (*Balistes capriscus*) was taken in Waterford Harbour on the 22nd July. Only five previous specimens have been recorded from Irish waters. The first specimen to be recorded from Irish waters of the Bogue (*Box boops*) was taken on the 2nd November, 1959, in Dingle Bay and, on the 21st November, a blackmouthed dogfish (*Pristiurus melastomus*) was taken in the same area. The specimen of the black-mouthed fish is the third to be recorded from Irish waters. Two scarce fishes were recorded, the red-band or red-snake fish (*Cepola rubescens*) from the Saltee Islands area on the 11th May and the greater weaver (*Trachinus draco*) on the 5th November from Dingle Bay. Specimens of sea-fishes were identified by the Department's staff on behalf of the Irish Specimen Fish Committee.

INTERNATIONAL AND OTHER CONFERENCES.—

(1) International Council for the Exploration of the Sea.—The Inspector and Scientific Adviser and one of the Inspectors attended the annual conference of the International Council for the Exploration of the Sea in Copenhagen from the 5th to the 10th October, 1959. Papers prepared by officers of the Department were read to the Herring, Shellfish and Salmon and Trout Committees. The biologist to the Salmon Research Trust of Ireland, Incorporated, also contributed a paper to the Salmon and Trout Committee. Prior to the meeting a study tour to trout farms in Jutland, Denmark, was arranged by the Salmon and Trout Committee. The Inspector and Scientific Adviser, the Engineer and one of the Assistant Inspectors, together with the biologist of the Inland Fisheries Trust, Incorporated, took part in this tour and subsequently attended the meeting of the Salmon and Trout Committee.

(2) Challenger Society.—One of the Assistant Inspectors of Fisheries attended a " Joint Meeting of the Challenger Society with Marine Laboratories " at Windermere in May, 1959. In conjunction with this meeting he inspected the biological laboratory at Windscale.

(3) Fishing Boat Congress.—The Congress, which was organised by F.A.O., was held in Rome in April, 1959. Ireland was represented by an officer of the Department and two designers of fishing boats from a private firm and An Bord Iascaigh Mhara, respectively.

(4) Seminar on the Improvement of the Distribution and Retail Marketing of Fish.—An officer of the Department and representatives of the retail fish trade participated in this seminar which was held, under the auspices of the European Productivity Agency of O.E.E.C., in Neuwied/Rhein, Germany, in January, 1959.

(5) Seminar on the Marketing of Deep Frozen Produce in Europe.—This seminar, also under the auspices of the European Productivity Agency of O.E.E.C., was held in Verona, Italy, in October 1959, and was attended by an officer of the Department and representatives of the trade.

ENGINEERING.—In connection with the proposals for the training aboard sea-fishing vessels of boys who wished to enter the career of sea-fishing, inspections were made of a large number of likely craft to enable an assessment to be made in each individual case of its potentialities for training purposes.

The preparation of various technical documents, e.g. charts, was undertaken in connection with the Second United Nations Conference on the Law of the Sea due to be held in the spring of 1960.

The strength of the engineering section was increased substantially during the year to one Inspector and Engineer, one Engineer, four Assistant Engineers, one Surveyor and two Draughtsmen. One of the Assistant Engineers is engaged on sea fishery technological work.

TECHNICAL ASSISTANCE.—Under the Fisheries Technical Assistance programme the services of a Canadian fishery economist were procured through F.A.O. to review the sea-fishing industry and to advise as to its future development. During his survey of nine weeks' duration he visited all important fishing centres and consulted with representatives of the various sectors of the industry. A report based on his survey was awaited at the end of 1959. The Swedish consultant, who had been engaged to advise on fishery harbour development, completed his assignment. An official of the Department was selected to travel to the U.S.A. to participate in a ten months' course of training on fish marketing (including a study course at Cornell University) sponsored by the European Productivity Agency of O.E.E.C. Other work undertaken in 1959 included visits by officers of the Department to

(1) Denmark, to study fish-farming techniques,
(2) the Netherlands, to study eel fishing practices,
(3) Great Britain, to
   (*a*) study methods of lobster fishing and
   (*b*) inspect certain marine laboratories in connection with the proposed establishment of a marine research station in this country.

LEGISLATION.—The Fisheries (Consolidation) Act, 1959 (No. 14 of 1959), became law on the 8th July, 1959, and, except the postponed provisions, came into operation on 1st October, 1959. The Act consolidates the Fisheries Acts, 1842 to 1958, and certain other enactments relating to fisheries.

The Sea Fisheries (Amendment) Act, 1959 (No. 28 of 1959), which amended the Sea Fisheries Acts, 1952 to 1956, became law on 11th August, 1959. The Act increased from one million pounds to three million pounds the limit on advances to An Bord Iascaigh Mhara, extended the period of office of members of that Board and amended provisions for licensing of vessels for sea-fishing.

During the year one Statutory Instrument and one Bye-Law were made, particulars of which are given in Appendix No. 20.

PART II

INLAND FISHERIES

COASTAL EXTENT OF FISHERY DISTRICTS AND NAMES OF THE PRINCIPAL RIVERS IN EACH DISTRICT

District	Coastal Extent of District	Principal Rivers
No. 1 Dublin	Most easterly point on Red Island, Skerries, to Wicklow Head.	Liffey Vartry.
No. 2 Wexford	Wicklow Head to Kiln Bay, east of Bannow Bay, Co. Wexford.	Slaney Avoca.
No. 3 Waterford	Kiln Bay, east of Bannow Bay, to Helvick Head, Co. Waterford.	Suir Barrow Nore.
No. 4 Lismore	Helvick Head to Ballycotton Pier, Co. Cork.	Blackwater, Funshion, Bride, Awbeg.
No. 5 Cork	Ballycotton Pier to Crow Head, Co. Cork.	Lee, Owenboy, Bandon, Argideen, Ilen, Mealagh, Owvane, Coomhola, Glengarriff, Adrigole.
No. 7 Kerry	Crow Head, Co. Cork, to Kerry Head, Co. Kerry.	Roughty, Sheen, Finnihy, Blackwater, Sneem, Laune, Flesk, Maine, Caragh, Currane, Cummeragh, Inny.
No. 8 Limerick	Kerry Head, Co. Kerry, to Hag's Head, Co. Clare.	Shannon, Deel, Fergus, Mulcair, Little and Upper Brosna, Inny, Maigue, Feale.
No. 9[1] Galway	Hag's Head to the sea point of the boundary between the townlands of Keeraunagark South and Banraghbaun South, Co. Galway.	Corrib, Claregalway.
No. 9[2] Connemara	The sea point of the boundary between the townlands of Keeraunagark South and Banraghbaun South, Co. Galway, to Slyne Head Co. Galway.	Ballinahinch, Recess, Cashla, Owengowla, Invermore, Inverbeg, Screebe, Furnace.
No. 10[1] Ballinakill	Slyne Head to Pigeon Point, Westport Bay, Co. Mayo.	Culfin, Errif, Bundorragha, Dawros, Carrowniskey, Bunowen (Louisburgh).
No. 10[2] Bangor	Pigeon Point to Benwee Head, Co. Mayo.	Newport, Burrishoole, Owenduff, Owengarve, Owenmore, Glenamoy.

District	Coastal Extent of District	Principal Rivers
No. 11 Ballina	Benwee Head to Coonamore Point, Co. Sligo.	Moy, Cloonaghmore (Palmerston), Easkey.
No. 12 Sligo	Coonamore Point to Carrickgarve, Co. Sligo.	Ballisodare, Garavogue (Sligo), Bonet, Drumcliff.
No. 13 Ballyshannon	Carrickgarve to Rossan Point, Co. Donegal.	Erne, Bundrowes, Bundurf, Eske, Eanev Water, Oily, Glen.
No. 14[1] Letterkenny	Rossan Point to Malin Head, Co. Donegal.	Owenea, Gweebarra, Gweedore (Crolly), Clady, Lackagh, Lennon, Crana.
No. 17[2] Dundalk	Carlingford Lough to Clogher Head, Co. Louth.	Fane, Dee, Glyde.
No. 17[4] Drogheda	Clogher Head to the most easterly point on Red Island, Skerries, Co. Dublin.	Boyne, Blackwater, Deel.

NOTE.—The area comprised in the former No. 14[3] or Moville District was, by the Foyle Fisheries Act, 1952, incorporated in the Foyle Area which is administered by the Foyle Fisheries Commission.

INLAND FISHERIES

The total catch of salmon by all methods in 1959 was only slightly less than that in 1958, being 1,624,447 lb. valued at £482,527 compared with 1,653,972 lb. valued at £449,732. The catch of sea trout amounted to 77,723 lb. valued at £12,978 compared with 66,494 lb. valued at £10,529 for 1958. The total quantities of salmon and sea trout taken in the years 1957, 1958 and 1959 are given in Appendix No. 9. As in previous reports the catch of salmon and sea trout within the Foyle Fishery area (part of which was formerly the Moville Fishery District) is not included in these figures, but is shown separately in the section of the report dealing with the activities of the Foyle Fisheries Commission.

During 1959 conditions from May onwards were generally favourable towards netting, especially in the estuaries of the more important rivers, because lack of rain and low water generally did not permit the fish to ascend the rivers satisfactorily. Despite the favourable conditions for netting, the catches of grilse were not as high as might have been expected, being no better on average than those of the previous year when high water had an adverse effect upon netting operations. This suggests that the runs of grilse were not up to average. In addition, the runs of grilse were rather late in arriving in most of the important rivers. The runs of earlier fish seem, however, to have been somewhat better than in 1958, although as has been experienced for a number of years, there was a marked scarcity of salmon in the transitional period between the runs of spring fish and early summer fish and those of the grilse.

Particulars of the catches of salmon made in each fishery district for the years 1957, 1958 and 1959 are given in Appendix No. 10. The catch of salmon in 1959 was distributed as to the various methods as follows :

Draft nets	53·3%
Drift nets	21·7%
Rod and line	16·0%
Stake nets and other methods	9·0%

The proportion of fish taken on rod and line decreased considerably in 1959 when compared with that of 1958, due almost entirely, it is considered, to the prolonged drought from mid-June until the close of the season during which, in general, rod fishing for salmon was adversely affected. The actual number of salmon taken on rod and line was 31,338 fish, a considerable reduction on the record figure of 49,696 in 1958. The weight of the rod catch of salmon in 1959 was 275,973 lb. valued at £81,106. The average weight of salmon and grilse landed on rod and line was 8·2 lb. which was considerably higher than that of the previous three years. The main reason for this increase may be attributed to the low catches of grilse in 1959, due to adverse angling conditions from June onwards.

The total number of rod licences issued in 1959 was 7,791 compared with 8,294 (excluding endorsements) in 1958. The reduction in the numbers of rod licences in 1959 can be regarded as due to the adverse conditions prevailing during the second half of the angling season. The average catch of salmon per rod licence for the Fishery Districts as a whole in 1959 amounted to 4·0 fish, weighing 35·4 lb. and valued at £10 8s. 2d. compared with 5·9 fish, 44·9 lb. and £12 13s. 6d. for 1958. The highest average weight of salmon on the rod (10·6 lb.) was again recorded for the Drogheda District and the lowest average weight (5·8 lb.) for the Connemara District, in which the bulk of the rod-caught fish are grilse.

The catch of sea-trout by all methods showed an increase over that of the previous year. The catch was distributed as to methods of capture as follows :—

Rod and line	53·4%
Drift nets	31·5%
Other methods	15·1%

There was a drop in the proportion of sea trout taken on rod and line which, having regard to the adverse weather conditions as far as angling for sea trout was concerned, was not surprising.

The form in which catch statistics are compiled does not lend itself to expressing catch in terms of sea trout per rod so as to give a true indication of the potentialities of the sea trout fisheries of this country. As examples from leading sea trout districts, it may be mentioned that the returns for the Connemara District show an average of some 37 sea trout weighing 34 lb. landed per rod, while those for the Kerry District work out at 17 sea trout weighing 20 lb. per rod.

Drift net fishing for salmon in the open sea off the Donegal/Mayo coasts, which depends on the runs of grilse, was obviously affected by the calm bright weather for part of June and July. Under these conditions salmon fishing by drift nets in the open sea is not effective and in consequence the catches were low for that part of the season.

The smolt run in 1959 was reported as having been satisfactory. The spawning season of 1959/60 is also believed to have been good in most districts, although the very high water which prevailed over most of the season made accurate observation difficult in some areas.

Despite the low water conditions which prevailed for long periods from June onwards, mortality due to pollution and disease appears to have been relatively light during the year. Some mortality, which was not surprising in the circumstances, was experienced during the heat-wave in July and August, especially in small streams which tend to dry-up during drought conditions, but even this mortality was not as extensive as might have been expected from the high temperatures and low water which prevailed for long periods.

During 1959 two officers of the Department paid visits to salmon markets in Great Britain for the purpose of investigating the quality of Irish salmon as sold on those markets and in particular at Billingsgate (London), Manchester and Liverpool. The information disclosed

by such visits has enabled the Department to take appropriate action in any case in which the quality of the fish exported was below average.

The Corporation of Dublin Wholesale Fish Market handled 50,986 salmon and grilse weighing 401,252 lb. in 1959, compared with 58,598 fish weighing 407,909 lb. in 1958. This market provides the only general auction for Irish salmon.

The catch of eels in Irish rivers was adversely affected during 1959 by the early low water conditions and subsequently by heavy floods. Almost the entire catch of eels taken in this country is exported—mainly to Great Britain. In 1959, 345,623 lb. of eels valued at £36,975 were exported.

BOARDS OF CONSERVATORS.—Details of Receipts and Expenditure of Boards of Conservators in 1959 are given in Appendix No. 16 to this Report.

EMPLOYMENT IN THE INDUSTRY.—Exclusive of persons employed in the marketing and transport of fish, a total of approximately 5,000 persons found either whole-time or part-time employment in inland fisheries during the year. The figure includes 3,250 persons engaged in netting for salmon under common law right and 950 employed by Boards of Conservators on protection of fisheries over the open and close seasons, the remainder being employed by proprietors of commercial salmon fisheries, by fishery owners or by angling associations.

INSTRUMENTS OF CAPTURE.—The total number of fishing licences of all kinds issued during the year was 9,165 representing a decrease of 1,888 on the figure for 1958 or a decrease of 461 if the number of endorsement licences for 1958 is disregarded (see note on new rod licensing arrangements under the heading "Legislation"). The totals in recent years were 1958, 11,053 ; 1957, 10,531 ; 1956, 10,135 ; 1955, 9,027 ; 1954, 8,690 ; 1953, 8,444.

The numbers of the various classes of licences issued in each fishery district during the year and the rates of licence duty are given in Appendices 17 and 18 respectively.

SALMON EXPORTS.—The quantity of salmon exported in 1959 was 13,682 cwt. valued at £547,135 as compared with 14,006 cwt. valued at £533,593 in 1958. These figures include landings of salmon in Co. Donegal from waters in the area administered by the Foyle Fisheries Commission. The average export price per cwt. of £39 19s. 0d. obtained in 1959 was higher than the corresponding figure in 1958, which was £38 1s. 10d.

The number of salmon exporters licensed under the Agricultural and Fishery Products (Regulation of Export) Act, 1947 (Export of Salmon) Order, 1954 (S.I. No. 275 of 1954), was 89.

Of the total quantity of salmon exported 11,687 cwt. went to Great Britain and 1,180 cwt. to France.

FISH CULTURE.—Details of salmon, trout and brown trout ova produced at the various hatcheries are given in Appendix No. 21. The output of salmon ova in the 1958/59 spawning season amounted to 3,474,000, the highest for many years. 1,135,000 salmon ova and 117,000 sea trout ova were distributed from the Department's hatchery at Glenties, Co. Donegal, and the State-assisted hatchery at Lismore, Co. Waterford, during 1959. The Inland Fisheries Trust, Incorporated, hatched 175,000 salmon fry on behalf of Bord na Mōna and released them in the River Boyne and its tributaries as part of a scheme financed by the Board for the improvement of the salmon fisheries of that river.

In the course of the year 350,000 brown trout from three months to two years old were stocked in Trust waters. In addition, quantities of fry, fingerling and yearling brown trout produced at Fanure Fish Farm, Roscrea, Co. Tipperary, and at the Lough Sheelin hatchery, Co. Longford, were supplied to a total of 46 angling bodies. Selected waters were also stocked by the Trust with rainbow trout and other waters not suitable for trout were stocked with coarse fish. Inspections were carried out by the Department on behalf of persons wishing to stock private waters with rainbow trout and permission was given for planting in a number of these waters. The fish in all cases were supplied by the Trust.

Inspections were made of likely sites for the setting up of demonstration fish pond units for the production of rainbow trout for food. Plans were prepared and tenders sought for the construction of two units, one at Tooreen, Glen of Aherlow, Co. Tipperary, and the other at Blackwater, Enniscorthy, Co. Wexford. Investigations were carried out by the Trust into food supplies for pond-trout and a special type of food pellet, suitable for feeding to five months old fish, was produced.

Officers from the Department engaged in the development of fish farming and the biologist attached to the Trust took part in a visit to Danish fish farms organised in connection with the meeting of the International Council for the Exploration of the Sea held in Copenhagen. Through the courtesy of Irish Trout Industries Ltd., 19, Lr. Pembroke Street, Dublin, they were also enabled to visit a number of private fish farms in Denmark.

SCIENTIFIC INVESTIGATIONS.—In 1946 the International Council for the Exploration of the Sea drew up a programme for research on an international scale of the movements of clean salmon in the open sea. Since 1948 Ireland has co-operated in this programme and in 1959 clean salmon taken at Ardmore, Co. Waterford, in drift nets were tagged and released alive. In all, 107 salmon were so tagged and 36 (34·6%) recoveries of tags were obtained. Salmon were recaptured as follows: River Blackwater (16), River Bandon (5), Rivers Slaney and Laune (2 each), Rivers Nore, Ilen, Argideen, Waterford Harbour, Kilmalieu Bay on the west coast of Scotland and Black Dog, North of Aberdeen (1 each). A preliminary report upon the results of these experiments was prepared and presented to the Salmon and Trout Committee of the International Council for the Exploration of the Sea at its meeting in Copenhagen in October, 1959.

Kelts were tagged in the Rivers Ballisodare, Blackwater, Erne, Lee, Nore, Owenea and Shannon during 1959. In all, 1,442 salmon and 129 sea-trout kelts were tagged. Recaptures of tagged kelts numbering 19 (13 of salmon and 6 of sea trout) were made during the year.

Material consisting of sets of scales together with relevant data from the salmon of the Rivers Corrib, Erne, Moy and Shannon was collected and examined during the year. A report upon the salmon of the River Corrib has already been printed as Appendix No. 23 to the Annual Report for 1958. A report upon the salmon of the River Erne is printed as Appendix No. 23 to this Report.

A small collection of scales of sea trout from the Argideen River, kindly made available by local anglers, was examined during the year and a report thereon was accepted for publication in the *Salmon and Trout Magazine*.

Large numbers of sets of scales were examined by the Department's staff on behalf of anglers who were interested in scientific information about their catches. This service has been of value both to the anglers themselves and the Department, as it has provided information, which would otherwise not have been forthcoming, on a number of outstanding fishes.

Investigations into the predations of pike upon brown trout and salmon continued throughout the year. Up to the end of 1959 the stomach contents of over 10,000 pike from Loughs Conn, Corrib and Mask were examined. Almost eighty per cent. of these pike had empty stomachs. Of the Lough Conn pike whose stomachs contained food, 58·3% had been feeding exclusively on salmonid fishes. The corresponding figures for the pike from Loughs Corrib and Mask were 54.2% and 67.7%, respectively. Investigations as regards the pike of Lough Derravarragh indicated that the dominant food was perch. These investigations have, therefore, confirmed earlier reports of the adverse effect which the pike has on the stocks of trout and salmon in our rivers.

During the year specimens of char (*Salvelinus spp.*) from a number of waters were received for identification and at the end of 1959 a report had been prepared on char examined since 1957. This report was accepted for publication in the *Irish Naturalists' Journal*. Some small immature specimens of the twaite shad (*Alosa finta*) were identified from the catches of small fishes taken in the stake-nets in Waterford Harbour, near Passage East, in November, 1959. The adult form of this species has already been identified from the rivers flowing into the Waterford Harbour.

Specimens of hybrids of rudd and bream from a number of Irish waters were also examined.

The Department's scientific staff continues to give advice to officers of Boards of Conservators on the subject of fish, etc. taken illegally and in a number of cases they have given expert evidence in Court proceedings. Departmental officers also assisted in the investigation of pollution problems.

The Department's Inspector and Scientific Adviser has continued to act as Chairman of the Irish Specimen Fish Committee. In connection with this organisation he has examined all available material relating to the growth of large brown trout taken in the past ten years and at the close of 1959, a report upon these outstanding trout was accepted for publication in the *Salmon and Trout Magazine*. He also directs the scientific work of the Foyle Fisheries Commission and the Salmon Research Trust of Ireland, Incorporated.

Investigations undertaken, with aid of a studentship established under the Technical Assistance Programme, of the trout stocks in Poulaphouca reservoir were concluded. Examination of material with a view to compilation of a report was in progress at the close of the year.

OFFENCES AGAINST THE FISHERY LAWS.—The number of prosecutions during 1959 was 248 as compared with 249 in 1958. The Garda Síochána continued to co-operate with Boards of Conservators in the protection of inland fisheries throughout the year.

FOYLE FISHERIES COMMISSION.—The Commission, which consists of two members nominated by the Minister for Lands, Dublin, and two by the Minister of Commerce, Belfast, is entrusted with the management of the several fishery in the tidal waters of the River Foyle and protection of fisheries in the Foyle Area. A detailed review of the Commission's activities is given in that body's annual report for the year ended 30th September, 1959.

The drought conditions which prevailed during the 1959 season affected the catch of salmon and sea trout in the area and the total catch was lower than the average for the previous five seasons. Particulars of catches by nets and rods, as published in the Report, were as follows :—

	Salmon		Sea Trout		Total	
	Number	lb.	Number	lb.	Number	lb.
Nets ..	72,428	517,556	2,232	2,936	74,660	520,492
Rods ..	571	4,815	1,876	2,283	2,447	7,098
Total ..	72,999	522,371	4,108	5,219	77,107	527,590

With the approval of the Minister and the Ministry, the Commission made the following regulations :—

Foyle Area (Production of Licence) Regulations, 1959.

Foyle Area (Close Season) Regulations, 1959.

Foyle Area (Rivers Faughan and Roe Angling) Regulations, 1959.

INLAND FISHERIES TRUST INCORPORATED.—An intensification of the Trust's development programme was made possible by the prolonged fine weather and by the provision of additional funds

during the year. The grant-in-aid provided in the Fisheries Vote amounted to £25,000 as compared with £20,000 in the previous year and Bord Fáilte Eireann contributed £23,000 under the Angling Development Plan.

The Trust continued its work of development of brown trout fisheries. Predators were removed from brown trout waters, and spawning grounds were improved. 350,000 brown trout from three months to two years old were placed in waters controlled by the Trust, and ova, fry, fingerlings and yearlings were supplied to clubs and organisations for stocking.

Selected waters were also stocked, some with rainbow trout and some with sea trout and salmon fry.

Work on the improvement of coarse fishing in the tourist interest was also undertaken. Carp, tench, bream and rudd were placed in coarse fish waters. Fishing stands and amenities were provided and other improvements were carried out. Teams of visiting anglers, who were brought to various centres on the invitation of Bord Fáilte Eireann, were given guidance and directions by the Trust's Coarse Fishing Organiser.

The trout, both brown and rainbow, used by the Trust for stocking or sold to clubs and organisations for that purpose, were reared at the Trust's fish farm at Roscrea or at its hatchery at Lough Sheelin. Carp and tench were produced for stocking coarse fish waters, as well as rainbow trout for table use.

Promotion of sea-angling was continued and surveys were made of fishing grounds and shore facilities. In co-operation with the Irish Federation of Sea Anglers, encouragement was given to the formation of sea angling clubs ; the Trust's Sea Angling Organiser accompanied teams of visiting sea anglers who were brought to Irish centres to sample and report on the fishing. As a further publicity measure showings of two films on sea angling were arranged in centres in Britain.

A detailed account of the activities during the year is given in the Trust's annual report and statement of accounts.

SALMON RESEARCH TRUST OF IRELAND, INCORPORATED. —The report of the Trust for the year ended 31st December, 1959, contains preliminary results of a qualitative survey which is intended to serve as a basis for further more detailed work on the environment of salmon in the fresh water stage.

The Trust's installations at Furnace, Co. Mayo, were completed during the year and traps for ascending and descending migrant fish commenced working in April, 1959. Erection of a new hatchery and rearing house commenced towards the end of the year. The hatchery will have a capacity of 250,000 and the rearing house 100,000.

Other activities of the Trust included the rearing of salmon of known ancestry, the continuation of the programme of tagging of salmon and sea trout, smolts and kelts and further study of fish predators.

ENGINEERING.—The arterial drainage scheme for the River Corrib reached the stage calling for the dismantling and reconstruction of the salmon weir and eel weir at Galway in course of executing the rock cut in the river bed. This work was carried out by the Office of Public Works in close collaboration with the engineers of Fisheries Division. Plans were put in hand for the construction of a salmon hatchery and rearing station at Cong, the primary purpose of which will be the rehabilitation of salmon stocks in the Corrib system. Other drainage works in progress which called for attention were those for the Rivers Nenagh, Maine and Deele/Swillyburn.

Proposals for drainage of the Moy catchment, which were developed further, called for extensive investigation and the Office of Public Works agreed to carry out a sounding survey of Loughs Conn and Cullen with a view to the assessment of the effect of the drainage proposal on those lakes. Proposed schemes for the Killimor and Ballyteigue rivers were also investigated.

Investigation of the effects of the passage of smolts through turbines, begun in 1958 at Ballyshannon, is continuing. The results to the end of 1959 suggest that the effects on smolts may not be as serious as had been believed at the particular power stations under investigation.

Other problems arising from the execution of hydro-electric schemes in salmon rivers included provision in the River Clady system of fish pass facilities and alternative spawning grounds, and in the River Lee the deoxygenation of the waters of the reservoirs due apparently to natural causes associated with the impounding of waters to a great depth.

One of the first projects to be investigated under the programme for improvement of salmon rivers was that connected with the Ennistymon River. Investigations into river flow and study of the circumstances in which movement of salmon is obstructed were sufficiently advanced for the design of a suitable fish pass arrangement to be undertaken. Other rivers inspected under the scheme included the Dargle, Easkey, Gweebarra, Boliska and Carhan rivers. Advice was given to a number of boards of conservators on proposed works for the improvement of spawning beds.

Advice was provided where requested on the design and construction of eel weirs and some general investigations were undertaken into problems affecting development of eel fisheries. The Engineer continued his study of eel fisheries in Europe with an inspection of installations and marketing techniques in The Netherlands. Facilities for this study were kindly made available by Dr. Korringa, Ryksinstituut Voor Visserij Onderizoek, IJmuiden.

Work on the trapping and rearing installations of the Salmon Research Trust at Furnace, Co. Mayo, was completed in the course of the year.

LEGISLATION.—The Fisheries (Consolidation) Act, 1959 (No. 14 of 1959), became law on the 8th July, 1959, and, except the postponed provisions, came into operation on 1st October, 1959. The Act consolidates the Fisheries Acts, 1842 to 1958, and certain other enactments relating to fisheries.

During the year four Statutory Instruments and two Bye-Laws were made, particulars of which are given in Appendix No. 20.

Salmon rod licences—new arrangements

The Fisheries (Amendment) Act, 1958, made new provisions as to the period and area of validity for the various types of rod licences and enabled the Minister to increase licence duty for fishing engines generally. The duties on rod licences were increased as from 1st January, 1959, and are shown in Appendix No. 18.

The major change was the introduction of a licence valid for all the fishery districts. Persons who wish to fish in one district only can obtain a licence valid for that district at the rate of £3 (or £2 as from 1st July) as compared with £4 (or £3 as from 1st July) for an all-district licence.

The number of all-district licences taken out was less than anticipated but it is expected that the number will increase considerably in future once the advantages (particularly flexibility) attached to a licence which can be used throughout the country become known, especially to tourists. Another innovation, which proved very popular, was the introduction of a seven-day licence.

Excess licence duties (i.e. the amounts by which certain rod licence duties were increased as from 1st January, 1959) are surrendered by the issuing Boards of Conservators for the credit of the Salmon Conservancy Fund. As explained in an earlier Report, the resources of this Fund—consisting now of the proceeds of salmon export levy, excess licence duties and grants from the Exchequer—are to be employed in supplementing the income of Boards of Conservators and in carrying out schemes for the improvement of inland fisheries.

MICHEÁL Ó MÓRÁIN
Minister for Lands.

30th December, 1960

APPENDICES TO THE REPORT ON SEA AND INLAND FISHERIES FOR THE YEAR 1959

Appendices 9 to 15 are compiled from returns furnished by licence holders in pursuance of the Statistics (Salmon, Sea Trout and Eels) (No. 2.) Order, 1945.

APPENDIX No. 1.

Total Quantity and Value of SEA FISH (excluding Salmon) returned as LANDED during the year 1959.

KINDS OF FISH	EAST COAST (Omeath to Carnsore Point)		SOUTH COAST (Carnsore Point to Loop Head)		WEST COAST (Loop Head to Erris Head)		NORTH COAST (Erris Head to Moville)		TOTAL	
	cwt.	£	cwt.	£	cwt.	£	cwt.	£	cwt.	£
Brill	115	1,331	978	8,791	205	2,125	227	2,206	1,525	14,453
Cod	14,825	87,143	4,477	22,549	332	2,076	4,925	23,230	24,559	134,998
Conger Eel	279	530	294	785	3	8	46	108	622	1,431
Haddock	863	3,601	7,243	23,018	383	2,149	11,098	35,275	19,587	64,043
Hake	1,194	10,188	578	2,712	64	460	208	906	2,044	14,266
Ling	322	801	217	749	2	12	85	254	626	1,816
Plaice	8,745	74,118	6,249	55,780	1,080	10,727	4,419	32,271	20,493	172,896
Ray/Skate	9,876	29,515	8,721	22,816	5,865	23,007	4,967	15,648	29,429	90,986
Soles	351	5,879	2,020	28,776	159	2,118	262	4,329	2,792	41,102
Turbot	198	2,088	868	7,761	247	3,129	195	1,811	1,508	14,789
Whiting	66,570	72,165	24,601	41,303	13,006	35,654	19,652	32,440	123,829	181,562
Others	5,205	14,180	12,378	30,010	4,125	8,428	9,456	15,738	31,164	68,356
TOTAL DEMERSAL	108,543	301,539	68,624	245,050	25,471	89,893	55,540	164,216	258,178	800,698
Herring	10,261	9,509	202,636	248,383	6,195	5,922	88,972	100,316	308,064	364,130
Mackerel	10	24	22,013	34,489	1,353	2,705	2,269	3,760	25,645	40,978
Sprat	—	—	—	—	—	—	432	165	432	165
TOTAL PELAGIC	10,271	9,533	224,649	282,872	7,548	8,627	91,673	104,241	334,141	405,273
TOTAL WET FISH	118,814	311,072	293,273	527,922	33,019	98,520	147,213	268,457	592,319	1,205,971
	No.		No.		No.		No.		No.	
Crabs	7,782	161	14,826	313	—	—	52,920	1,298	75,528	1,772
Crayfish	—	—	125,618	56,604	121,380	49,438	24,612	8,429	271,610	114,471
Escallops	24,000	493	158,870	2,988	268,895	3,557	—	—	451,765	7,038
Lobsters	37,336	8,627	240,861	63,814	160,308	40,187	184,592	60,542	623,097	173,170
Oysters	—	—	29,600	363	609,623	9,106	—	—	639,223	9,469
	cwt.		cwt.		cwt.		cwt.		cwt.	
Norway Lobsters	14,436	47,653	15	22	—	—	250	750	14,701	48,425
Mussels	7,436	2,155	21,627	4,880	—	—	117	48	29,180	7,083
Periwinkles	2,783	2,607	12,145	12,251	19,119	20,898	4,356	4,356	38,403	40,112
Other Shellfish	213	229	370	674	75	111	200	162	858	1,176
TOTAL VALUE SHELLFISH	—	61,925	—	141,909	—	123,297	—	75,585	—	402,716
TOTAL VALUE ALL FISH	—	372,997	—	669,831	—	221,817	—	344,042	—	1,608,687

APPENDIX No. 2.

Comparison for the eight years, 1952–1959, of the Average Prices per cwt. of various kinds of Sea Fish.

	1952	1953	1954	1955	1956	1957	1958	1959
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Brill	8 14 11	9 7 10	8 9 10	8 15 3	9 11 4	9 14 11	8 0 0	9 9 7
Cod	4 5 7	4 11 4	5 1 4	4 14 0	4 12 6	4 5 6	4 14 0	5 9 11
Conger Eel	1 16 2	1 3 2	1 11 0	1 15 5	2 1 2	2 2 11	2 4 11	2 6 0
Haddock	3 12 8	2 2 2	2 8 5	2 0 2	2 5 5	2 2 0	2 17 1	3 5 5
Hake	2 18 7	2 18 0	3 18 3	4 17 6	5 17 11	4 17 0	6 9 7	6 19 7
Ling	3 6 0	3 16 4	3 10 7	2 10 5	2 10 11	2 7 10	2 8 0	2 18 0
Plaice	5 10 11	5 8 9	7 11 2	7 3 7	7 2 3	7 8 9	8 3 6	8 8 8
Ray or Skate	2 5 10	2 12 5	2 12 11	2 8 8	2 9 3	2 6 7	2 15 3	3 15 5
Soles	10 8 9	9 12 6	11 5 5	11 5 0	12 11 4	15 6 7	14 5 10	14 14 5
Turbot	7 19 8	9 7 1	8 9 0	7 18 9	9 15 3	9 2 0	10 7 1	9 16 2
Whiting	1 12 10	1 14 0	1 12 8	1 12 0	1 9 2	1 3 4	1 5 3	1 9 4
Herrings	1 2 0	1 3 9	1 1 4	0 15 3	0 14 9	0 14 10	1 1 3	1 3 8
Mackerel	1 12 3	1 9 11	1 9 9	1 12 9	1 15 10	1 11 7	1 2 4	1 11 11
Sprats	0 8 3	0 8 0	0 3 6	0 4 2	0 10 0	0 5 6	0 6 8	0 7 8

N.B.—" Average price " as shown in this table represents total value divided by total weight for each kind of fish, year by year. It does not purport to take direct cognizance of any abnormal rise or fall in price attributable to a seasonal glut or shortage of a particular kind of fish.

APPENDIX No. 3.

FISH IMPORTS AND EXPORTS, 1959

(as compared with those of 1958).

	Quantity		Value	
	1959	1958	1959	1958
I.—IMPORTS	cwt.	cwt.	£	£
Fish, fresh, chilled or frozen	12,106	7,461	80,416	38,624
Fish, cured—not in airtight containers	26,819	29,742	164,343	171,243
Fish and fish preparations in airtight containers	19,846	20,679	366,102	366,895
Other fish and fish preparations	3,894	3,247	32,258	26,114
TOTALS	62,665	61,129	643,119	602,876
II.—EXPORTS				
Fish, fresh, chilled or frozen:				
Salmon	13,682	14,006	547,135	533,593
Herrings	177,089	171,462	334,511	255,288
Fresh water eels	3,086	2,544	36,975	31,904
Other fish	22,253	52,570	41,219	83,442
Fish dried, salted or smoked not in airtight containers	57,687	28,063	155,962	78,278
Shell fish, fresh, chilled, frozen, salted, dried	76,581	83,054	426,704	374,947
Other fish and fish preparations	5,390	426	83,066	3,767
TOTALS	355,768	352,125	1,625,572	1,361,229

The figures given above for exports of salmon and trout include those relating to exports from the former Moville Fishery District now comprised in the Foyle Area.

APPENDIX No. 4.

HERRING FISHING, 1959.

County	Ports at which more than 500 cwt. were landed	Total Quantity cwt.	Value £
Louth	Clogher Head	3,625	2,850
Dublin	Howth, Skerries	4,866	4,196
Wicklow	—	190	292
Wexford	Rosslare	1,790	2,360
Waterford	Dunmore East	195,288	241,022
Cork	Schull, Baltimore, Ballycotton, Kinsale	5,400	5,612
Kerry	Dingle	1,738	1,560
Clare	—	190	209
Galway	—	725	833
Mayo	Keel and Keem, Achill	5,280	4,880
Sligo	—	—	—
Donegal	Killybegs, Burtonport, Bunbeg, Kincasslagh, Downings, Teelin, Port, Inver, Magheroarty	88,972	100,316
	TOTALS	308,004	364,130

APPENDIX No. 5.

MACKEREL FISHING, 1959.

County	Ports at which more than 250 cwt. were landed	Total Quantity cwt.	Value £
Louth	——	—	—
Dublin	——	10	24
Wexford	Kilmore Quay ..	578	1,721
Waterford	Passage East, Dunmore East ..	2,773	4,786
Cork	Baltimore, Schull, Kinsale, Ballycotton, Youghal	13,844	20,242
Kerry	Dingle, Dunquin, Brandon Creek ..	4,818	7,740
Clare	Kilkee	533	1,135
Galway	——	500	1,010
Mayo	Lackan	1,569	2,828
Sligo	——	—	—
Donegal	——	1,020	1,492
	TOTALS	25,645	40,978

APPENDIX No. 6.

PERSONNEL ENGAGED IN FISHING: AND REGIONAL DISTRIBUTION AND CLASSIFICATION OF FISHING CRAFT IN 1959.

HOW ENGAGED (i.e. whether solely or partially)	MEN	Motor Vessels						Sail Boats						Row Boats		TOTAL VESSELS
		1st Class			2nd Class		3rd Class	1st Class			2nd Class		3rd Class	Unclassed A	Unclassed B	
		25 tons gross and over	20 tons gross and over but less than 25 tons	15 tons gross and over but less than 20 tons	10 tons gross and over but less than 15 tons and of 18' keel and upwards	Under 10 tons gross and of 18' keel and upwards	Less than 18' keel.	25 tons net and over	20 tons net and over but less than 25 tons	15 tons net and over but less than 20 tons	10 tons net and over but less than 15 tons and of 18' keel and upwards.	Under 10 tons and of 18' keel and upwards	Less than 18' keel	Open boats of 18' keel and upwards and canoes of 18' or more over all	Open boats of less than 18' keel and canoes of less than 18' over all	
EAST COAST																
Solely engaged	494	75	4	2	5	13	—	—	—	—	—	2	—	33	5	139
Partially engaged	352	1	—	3	1	21	—	—	—	—	3	9	2	47	3	90
Laid-up	—	4	4	1	3	2	—	—	—	—	—	1	3	12	—	34
TOTALS	846	80	8	6	9	36	—	—	—	—	3	16	5	92	8	263
SOUTH COAST:																
Solely engaged	638	74	2	11	34	96	2	—	—	2	5	39	24	158	26	473
Partially engaged	1,185	1	—	—	5	38	4	—	—	—	4	34	22	98	42	258
Laid-up	—	—	—	—	2	1	—	—	—	1	—	2	4	21	7	42
TOTALS	1,823	75	2	11	41	140	6	—	—	3	9	75	50	277	75	773
WEST COAST:																
Solely engaged	240	13	4	3	6	27	—	—	—	—	2	31	7	109	64	420
Partially engaged	1,500	—	3	1	1	12	—	—	—	—	—	30	15	86	113	262
Laid-up	—	—	—	—	—	—	—	—	—	—	2	—	—	2	—	4
TOTALS	1,740	13	7	4	7	39	—	—	—	—	6	63	22	257	274	602
NORTH COAST:																
Solely engaged	399	32	3	4	8	32	—	—	—	—	1	94	3	118	27	386
Partially engaged	1,305	—	—	2	3	24	1	—	—	—	2	62	10	50	34	188
Laid-up	—	1	—	—	—	—	—	—	—	—	—	3	1	1	—	6
TOTALS	1,704	33	3	6	11	116	1	—	—	—	7	159	14	169	61	580
TOTALS FOR 1959:																
Solely engaged	1,771	194	13	20	53	228	2	—	—	2	12	160	34	478	219	1,424
Partially engaged	4,402	2	3	6	10	105	5	—	—	—	11	134	49	281	102	798
Laid-up	—	5	4	1	5	7	—	—	—	1	2	10	8	36	7	86
TOTALS	6,173	201	20	27	68	340	7	—	—	3	25	313	91	795	418	2,308

APPENDIX No. 7.

TRAWLING AND SEINING, 1959.

Port or Locality	Number of men engaged	Number of boats engaged	Tonnage of Motor Boats			Fishing Period
			Not exceeding 10 tons	Over 10 tons	Over 15 tons	
Clogherhead	45	9	4	—	9	All year.
Balbriggan	45	9	—	—	9	All year.
Skerries	50	16	5	1	10	All year.
Howth	80	16	—	—	16	All year.
Dublin	20	4	1	—	3	All year.
Dun Laoghaire	3	1	—	—	1	All year.
Bray	3	1	1	—	—	Summer months.
Wicklow	5	1	—	—	1	Sporadically all year.
Arklow	80	20	—	2	18	All year.
Courtown Harbour	3	1	—	1	—	Summer months.
Wexford	20	4	—	—	4	All year.
Rosslare Harbour	9	2	—	—	2	All year.
Kilmore Quay	44	10	—	3	7	All year.
Bannow and Bar of Lough	6	2	2	—	—	Summer months.
Duncannon, Fethard and Slade	9	3	1	—	2	All year.
Passage East	18	4	2	—	2	All year.
Dunmore East	40	10	—	—	10	All year.
Helvick	15	6	3	—	3	All year.
Youghal	10	4	—	3	1	Summer and early Spring.
Ballycotton	18	6	6	—	—	Summer months.
Rathcoursey	4	4	3	1	—	Summer months.
Cobh	8	2	—	2	—	All year.
Kinsale	4	1	—	1	—	All year.
Courtmacsherry	4	1	—	1	—	Mainly Summer.
Clonakilty and Dooneen	10	3	—	2	1	All year.
Union Hall	20	7	—	—	7	All year.
Baltimore	30	7	—	—	7	All year.
Schull	16	5	—	1	4	All year.
Castletownbere	30	7	—	—	7	All year.
Lauragh and Kilmakillogue	8	2	—	2	—	All year.
Ballinskelligs	4	1	—	—	1	All year.
Portmagee	20	3	—	—	3	Winter months.
Cahireiveen and Valentia	20	4	—	—	4	Winter months and early Spring.
Dingle	48	12	—	—	12	All year.
Aran Islands	30	6	—	—	6	All year into Galway.
Galway	15	4	—	—	4	All year.
Carraroe	5	1	—	—	1	All year.
Carna	4	1	1	—	—	October to December.
Cleggan	12	3	—	2	1	April to October.
Murrisk	4	1	—	—	1	All year.
Achill	21	7	2	1	4	All year.
Blacksod	4	1	—	—	1	All year.
Killybegs	125	25	—	25	—	All year.
Teelin	10	2	—	—	2	All year.
Burton Port	15	3	—	3	—	All year.
Downings	15	1	—	—	1	March to June, September to October.
Buncrana	12	3	—	—	3	All year.
Portaleen and Glengad	20	8	6	2	—	January to October.
Greencastle	42	15	7	6	2	All year.
Moville	21	7	2	2	3	All year.
TOTALS	1,104	286	46	61	173	

APPENDIX No. 8.

STATEMENT OF ACCOUNT

in respect of

Repayable Advances for the provision of boats and gear to fishermen made during the period of twenty-eight years to 31st March, 1959, to the Irish Sea Fisheries Association, Ltd., to the date of the Association's dissolution, 23rd April, 1952, and to An Bord Iascaigh Mhara, as from that date.

	£		£
Repayable with Interest on an annuity basis in respect of :—		Repayments to 31st March, 1958	324,863
(*a*) Advances amounting to £919,642, made up to 31st March, 1958	1,435,671	Repayments made during year ended 31st March, 1959	50,667
(*b*) Advances amounting to £130,335, made during year ended 31st March, 1959	225,906	Balance outstanding :—	
		Due in arrear 134,819	
		Instalments and Interest not matured .. 1,151,228	1,286,047
	1,661,577		1,661,577

NOTE.—Advances made to the Association and the Board are repayable on the basis of a twenty-year annuity in half-yearly instalments.

APPENDIX No. 9.

Quantity and Value of all Salmon and Sea Trout taken in each of the Three Years 1957, 1958 and 1959 by Instruments of Capture.

SALMON

Instruments	1959	1958	1957	1959	1958	1957
	lb.	lb.	lb.	£	£	£
Total for all engines	1,624,447	1,653,972	1,799,543	482,527	449,732	447,817
Total for rod and line	259,912	375,452	309,480	77,204	102,089	84,360
Total for drift nets	352,505	286,137	298,372	104,708	77,804	70,804
Total for draft nets	865,830	772,405	1,003,428	257,187	210,025	240,912
Total for stake nets, weirs, etc.	146,200	219,978	188,263	43,428	59,814	51,741

SEA TROUT

Instruments	1959	1958	1957	1959	1958	1957
	lb.	lb.	lb.	£	£	£
Total for all engines	77,723	66,404	100,503	12,978	10,529	15,615
Total for rod and line	41,504	40,308	56,575	6,930	6,391	8,517
Total for drift nets	5,631	1,402	3,564	875	222	515
Total for draft nets	24,483	23,573	37,357	4,088	3,738	6,034
Total for stake nets, weirs, etc.	6,105	1,121	3,007	1,085	178	549

This Appendix does not include returns from the former Moville Fishery District.

APPENDIX No. 10.

Quantity and Value of Salmon taken in each of the Three Years 1957, 1958 and 1959 by Fishery Districts.

Fishery District	*	Quantity			Value		
		1959 lb.	1958 lb.	1957 lb.	1959 £	1958 £	1957 £
Dublin	R	4,451	5,417	4,137	1,593	1,756	1,297
	N	8,595	2,739	3,494	2,758	768	938
Wexford ..	R	35,089	19,771	17,699	10,713	6,308	5,088
	N	36,463	33,335	32,281	12,067	11,802	10,054
Waterford ..	R	36,891	47,046	32,018	10,636	12,710	8,955
	N	168,943	140,436	161,041	43,014	30,374	40,410
Lismore ..	R	33,047	46,231	38,129	9,119	12,533	10,374
	N	135,215	131,133	129,947	46,530	32,597	32,456
Cork ..	R	21,119	26,573	28,812	6,413	8,370	8,606
	N	79,530	64,896	85,681	23,186	17,452	24,816
Kerry ..	R	30,040	38,947	37,515	8,584	10,714	8,647
	N	131,060	134,531	232,305	36,106	29,775	48,730
Limerick ..	R	44,751	84,216	52,720	13,297	24,105	15,776
	N	155,595	144,844	135,835	50,438	44,195	38,709
Galway ..	R	1,102	4,286	4,160	324	1,210	1,248
	N	43,148	31,789	36,496	12,816	9,400	10,949
Connemara	R	2,395	5,340	7,740	624	1,411	2,322
	N	Nil	Nil	Nil	Nil	Nil	Nil
Ballinakill ..	R	2,808	6,232	3,502	843	1,977	1,116
	N	16,459	19,095	20,578	3,384	4,150	3,717
Bangor ..	R	6,175	7,428	9,897	1,802	2,098	2,429
	N	57,736	80,073	93,816	12,228	16,859	18,819
Ballina ..	R	24,795	32,051	27,447	6,757	8,157	6,279
	N	247,282	216,223	238,344	89,003	66,051	63,263
Sligo ..	R	5,106	5,750	4,638	1,600	1,689	1,391
	N	21,587	30,736	46,878	5,181	7,674	9,843
Ballyshannon	R	2,523	4,566	7,127	768	1,329	2,138
	N	57,492	89,865	68,778	13,122	23,305	12,309
Letterkenny	R	11,812	23,617	22,502	3,128	5,989	5,423
	N	94,253	87,089	133,500	21,943	22,405	25,551
Dundalk ..	R	776	2,671	1,360	209	736	217
	N	29,080	24,195	21,249	7,450	6,083	5,435
Drogheda ..	R	13,093	12,241	10,178	4,696	4,051	3,054
	N	66,036	50,558	49,840	22,195	21,699	17,458
TOTALS		1,624,447	1,653,972	1,799,543	482,527	449,732	447,817

* R. indicates capture by means of single rod and line ; N. by means of nets, weirs, etc.

APPENDIX No. 11.

Quantity and Value of Sea Trout taken in each of the Three Years 1957, 1958 and 1959 by Fishery Districts.

Fishery District	*	Quantity			Value		
		1959 lb.	1958 lb.	1957 lb.	1959 £	1958 £	1957 £
Dublin	R	2,040	1,497	1,447	291	227	258
	N	7,777	8,047	8,108	1,727	1,657	1,630
Wexford ..	R	1,600	878	3,837	222	129	460
	N	5,776	5,384	8,608	892	813	1,307
Waterford ..	R	805	883	1,966	117	125	318
	N	326	109	710	51	16	110
Lismore ..	R	322	715	1,740	49	102	337
	N	2,089	1,482	2,761	307	249	426
Cork	R	5,416	3,853	6,134	784	558	1,019
	N	995	1,139	1,419	131	184	165
Kerry	R	6,600	8,307	12,294	952	1,198	1,967
	N	4,507	4,384	4,450	836	747	752
Limerick ..	R	1,955	1,455	1,732	304	213	228
	N	6,837	3,408	7,431	1,473	632	1,365
Galway	R	352	879	1,440	55	154	216
	N	733	533	603	147	106	90
Connemara ..	R	7,431	6,050	8,949	1,186	822	1,542
	N	Nil	Nil	Nil	Nil	Nil	Nil
Ballinakill ..	R	2,254	4,098	636	378	667	80
	N	1,093	820	1,255	155	95	138
Bangor ..	R	3,016	3,077	5,766	449	551	837
	N	1,269	517	3,325	211	77	428
Ballina ..	R	1,737	823	1,186	261	108	208
	N	16	144	150	4	20	15
Sligo	R	106	207	618	16	31	93
	N	191	36	100	29	7	15
Ballyshannon ..	R	653	459	391	94	49	48
	N	1,402	74	469	175	11	50
Letterkenny ..	R	2,435	3,169	5,029	352	418	475
	N	462	684	573	69	112	79
Dundalk ..	R	866	165	628	145	60	85
	N	1,359	306	881	246	44	140
Drogheda ..	R	3,950	1,160	1,782	641	179	346
	N	1,353	762	3,085	229	168	388
TOTALS ..		77,723	66,404	100,503	12,978	10,529	15,615

*R. indicates capture by means of single rod and line;
N. by means of nets, weirs, etc.,

APPENDIX No. 12.

Quantity and Value of Eels taken in each of the Three Years 1957, 1958 and 1959 by Fishery Districts.

Fishery District	Quantity			Value		
	1959 lb.	1958 lb.	1957 lb.	1959 £	1958 £	1957 £
Waterford ..	9,101	Nil	1,534	788	Nil	156
Cork	1,700	Nil	Nil	85	Nil	Nil
Limerick ..	65,520	59,947	106,957	8,567	7,646	13,358
Galway	63,201	58,735	53,008	6,666	7,384	6,805
Bangor	232	Nil	32	18	Nil	3
Ballina	16,245	8,965	6,249	1,546	716	661
Sligo	2,920	1,351	517	285	106	51
Ballyshannon ..	8,059	2,050	1,257	923	235	129
Dundalk	3,858	8,922	6,701	426	566	582
Drogheda ..	8,478	10,633	13,458	742	1,416	1,756
TOTALS ..	179,314	150,603	189,713	20,046	18,069	23,501

NOTE :—Figures as above are based on returns as furnished, which are not complete. A total of 345,632 lb. valued at £36,975 was exported during 1959.

APPENDIX No. 13.

Total Quantity and Value of Salmon, Sea Trout and Eels taken by all engines in each of the Three Years, 1957, 1958 and 1959 by Fishery Districts.

Fishery District	Total Weight for District			Total Value for District		
	1959 lb.	1958 lb.	1957 lb.	1959 £	1958 £	1957 £
Dublin ..	22,863	17,700	17,186	6,369	4,408	4,123
Wexford ..	78,928	59,368	62,425	23,894	19,052	16,909
Waterford ..	216,066	188,474	197,269	54,606	43,225	49,949
Lismore ..	170,673	179,561	172,577	56,005	45,481	43,593
Cork ..	108,760	96,461	122,046	30,599	26,564	34,606
Kerry ..	172,207	186,169	286,463	46,478	42,434	60,096
Limerick ..	274,658	293,870	304,675	74,079	76,791	69,436
Galway ..	108,536	96,222	95,707	20,008	18,254	19,308
Connemara ..	9,826	11,390	17,689	1,810	2,233	3,864
Ballinakill ..	22,614	30,245	25,971	4,760	6,889	5,051
Bangor ..	68,428	91,995	112,836	14,708	19,585	22,516
Ballina ..	290,075	258,206	273,376	97,571	75,052	70,426
Sligo ..	29,910	38,080	52,751	7,111	9,507	11,393
Ballyshannon	70,129	97,014	78,022	15,082	24,929	14,674
Letterkenny ..	108,962	114,559	161,604	25,492	28,924	31,528
Dundalk ..	35,939	36,249	30,819	8,476	7,489	6,459
Drogheda ..	92,910	75,406	78,343	28,503	27,513	23,002
TOTALS	1,881,484	1,870,979	2,089,759	515,551	478,330	486,933

APPENDIX No. 14.

Number, Quantity and Value of Salmon taken by Single Rod and Line during each of the Three Years, 1957, 1958 and 1959 by Fishery Districts.

Fishery District	No. of Fish			Quantity			Value		
	1959	1958	1957	1959 lb.	1958 lb.	1957 lb.	1959 £	1958 £	1957 £
Dublin ..	471	697	438	4,451	5,417	4,137	1,593	1,956	1,297
Wexford ..	3,615	1,963	1,636	35,089	19,771	17,699	10,713	6,308	5,088
Waterford	8,048	6,581	3,411	36,891	47,046	32,018	10,636	12,710	8,955
Lismore ..	3,528	5,511	4,704	33,047	46,231	38,129	9,119	12,533	10,374
Cork ..	2,701	3,507	3,591	21,119	26,573	28,812	6,413	8,370	8,606
Kerry ..	3,730	5,587	5,206	30,040	38,947	37,414	8,584	10,714	8,647
Limerick ..	5,095	11,135	6,983	44,751	84,216	52,720	13,297	24,105	15,776
Galway ..	141	777	595	1,102	4,286	4,160	324	1,210	1,248
Connemara	408	893	860	2,395	5,340	7,740	624	1,411	2,322
Ballinakill ..	391	925	427	2,808	6,232	3,502	843	1,977	1,116
Bangor ..	687	1,020	1,357	6,175	7,428	9,897	1,802	2,098	2,429
Ballina ..	2,832	5,033	4,288	24,795	32,051	27,447	6,757	8,157	6,279
Sligo ..	609	817	640	5,106	5,750	4,638	1,600	1,689	1,391
Ballyshannon	301	591	930	2,523	4,566	7,127	768	1,329	2,138
Letterkenny	1,454	3,567	3,558	11,812	23,617	22,502	3,128	5,989	5,423
Dundalk ..	86	259	136	776	2,671	1,360	209	736	217
Drogheda	1,241	933	887	13,093	12,293	10,178	4,696	4,051	3,054
TOTALS	31,338	49,696	39,647	275,973	372,435	309,480	81,106	105,143	84,360

APPENDIX No. 15.

Number, Quantity and Value of Sea Trout taken by Single Rod and Line during each of the Three Years 1957, 1958 and 1959 by Fishery Districts.

Fishery District	No. of Fish			Quantity			Value		
	1959	1958	1957	1959	1958	1957	1959	1958	1957
				lb.	lb.	lb.	£	£	£
Dublin ..	2,700	1,576	1,528	2,040	1,497	1,447	291	227	258
Wexford ..	2,792	1,214	5,755	1,600	878	3,837	222	129	460
Waterford ..	1,024	1,138	1,979	805	883	1,966	117	125	813
Lismore ..	349	940	1,566	322	715	1,740	49	102	337
Cork	6,396	4,183	9,342	5,416	3,853	6,134	784	558	1,019
Kerry	5,584	6,846	6,112	6,600	8,307	12,294	952	1,198	1,967
Limerick ..	2,458	1,882	2,060	1,955	1,455	1,732	304	213	228
Galway ..	408	982	960	352	879	1,440	55	154	216
Connemara ..	8,361	6,756	9,949	7,431	6,050	9,949	1,186	822	1,542
Ballinakill ..	2,144	4,222	571	2,254	4,098	636	378	667	80
Bangor ..	3,277	4,525	6,188	3,016	3,977	5,766	449	551	837
Ballina ..	1,985	1,001	1,336	1,737	823	1,186	261	108	208
Sligo	126	187	539	106	207	618	16	31	93
Ballyshannon	556	524	440	653	459	391	94	49	48
Letterkenny ..	2,587	3,265	5,010	2,435	3,169	5,029	352	418	475
Dundalk ..	919	278	724	866	165	628	145	60	85
Drogheda ..	3,768	1,125	2,409	3,950	1,160	1,782	641	179	346
TOTALS ..	45,434	40,644	56,468	41,538	38,675	56,575	6,296	5,591	8,617

APPENDIX No. 16

RECEIPTS AND EXPENDITURE OF BOARDS OF CONSERVATORS FOR THE YEAR ENDED 30TH SEPTEMBER, 1959.

Fishery District	RECEIPTS						EXPENDITURE					
	Opening Balance	Licence Duty	Fishery Rate	Grant from Department	Miscellaneous Receipts	Total Receipts	Salaries	Water Keepers	Law Costs	Travelling and Miscellaneous	Total Expenditure	Closing Balance
	£	£	£	£	£	£	£	£	£	£	£	£
Dublin	—29	1,768	223	700	351	3,042	420	1,299	384	1,174	3,277	—264
Wexford ..	342	1,466	1,247	400	67	3,180	200	2,107	204	921	3,432	90
Waterford ..	—340	3,326	2,441	2,500	247	8,514	398	5,274	26	3,124	8,822	—648
Lismore ..	1,465	1,633	5,256	1,000	129	8,018	925	5,862	91	1,837	8,715	768
Cork	358	2,267	689	6,500	197	9,653	762	4,870	66	2,178	7,876	2,135
Kerry	2,305	2,684	2,614	1,800	235	7,333	806	4,606	115	1,784	7,311	2,327
Limerick ..	4,314	3,667	3,952	2,700	388	10,707	1,099	5,418	166	3,722	10,405	4,616
Galway ..	1,640	717	2,673	—	515	3,905	1,517	994	—	1,072	3,583	1,962
Connemara ..	650	587	1,454	—	80	2,121	235	1,720	7	392	2,354	417
Ballinakill ..	—78	358	1,429	—	156	1,943	328	1,057	—	436	1,821	44
Bangor	926	916	1,134	800	341	3,191	828	1,377	13	969	3,187	930
Ballina ..	668	1,057	3,579	—	221	4,857	502	3,568	121	665	4,856	669
Sligo	912	534	1,074	—	32	1,640	480	683	30	559	1,752	800
Ballyshannon ..	799	924	439	3,008	307	4,678	508	2,180	43	1,404	4,135	1,342
Letterkenny ..	1,779	2,008	1,429	300	112	3,849	565	2,705	63	858	4,191	1,437
Drogheda ..	1,102	1,530	1,371	500	47	3,448	556	2,535	—	810	3,901	649
Dundalk ..	—4	425	289	1,000	34	1,748	343	565	98	473	1,479	265
TOTALS ..	16,809	25,867	31,293	21,208	3,459	81,827	10,472	46,820	1,427	22,378	81,097	17,539

Sums received by way of Special Local Licence duty, which were paid over to the Exchequer in accordance with Section 45 of the Fisheries (Consolidation) Act, 1959, are not included in this table.

APPENDIX No. 17.

PARTICULARS OF LICENCES ISSUED BY BOARDS OF CONSERVATORS FOR THE YEAR 1959.

Fishery District	Salmon Rod								Draft Net	Drift Net	Pole Net	Bag Net	Stake Net	Head Weir	Box or Crib	Loop Net	Snap Net	Gap, Eye or Basket for Eels	Long line for Eels.	Eel Trap	Special Local Licences (Tidal Waters)
	Annual (all districts)	Annual (district of issue.)	Late season (all districts)	Twenty-one day (all districts)	Seven day (all districts)	Late season (district of issue)	Foyle Area extension (all districts)	Foyle Area extension (district of issue.)													
Dublin	306	95	11		28	41	4	—	13	18	—	—	—	—	—	—	—	—	—	—	—
Wexford ..	112	134	—	—	102	53	. .	—	102	—	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .
Waterford ..	102	718	2	1	27	14	—	—	16	73	—	1	3	—	3	—	113	2	—	—	—
Lismore	71	280	10	2	137	—	—	—	11	60	—	—	2	—	1	—	16	1	—	—	—
Cork	224	278	10	3	98	36	—	—	62	27	—	—	—	—	1	—	—	—	—	—	—
Kerry	165	291	3	9	390	195	1	—	54	—	—	1	—	—	3	—	—	—	—	—	—
Limerick ..	90	805	—	—	21	18	. .	—	93	69	—	—	4	—	4	—	—	27	21	—	—
Galway ..	23	80	—	—	83	30	—	—	7	—	—	—	—	—	5	—	—	5	8	—	—
Connemara ..	14	3	4	3	173	93	—	—	. .	—	—	—	—	—	. .	—	—	—	—	—	—
Ballinakill ..	7	29	—	—	96	46	—	—	13	—	—	—	—	—	—	—	—	—	—	—	—
Bangor	47	42	20	9	233	56	2	—	30	1	—	4	—	—	—	—	—	1	—	—	—
Ballina	30	139	8	8	73	32	1	2	13	38	—	—	—	—	7	—	—	40	4	—	—
Sligo	48	85	5	—	9	5	—	—	7	1	—	1	—	—	—	—	—	2	4	—	—
Ballyshannon ..	27	52	5	2	78	3	20	23	56	2	—	—	—	—	2	—	—	8	9	—	9
Letterkenny ..	50	315	10	6	143	83	35	120	41	37	—	—	—	—	2	28	—	—	—	—	12
Dundalk ..	33	39	5	—	. .	16	2	13	25	—	—	—	—	—	—	—	—	1	1	—	—
Drogheda ..	131	100	7	2	31	17	—	1	133	—	. .	—	—	—	6	—	—	2	1	7	—
TOTALS ..	1,480	3,483	100	44	1,722	738	65	159	676	326	—	7	9	—	34	28	129	89	48	7	21

APPENDIX No. 18.

Licence Duty payable on the undermentioned fishing engines.

	£	s.	d.
On each Salmon Rod—Annual (valid all districts)	4	0	0
Do. Salmon Rod—Late Season (valid all districts)	3	0	0
Do. Salmon Rod—Twenty-one day (valid all districts)	3	0	0
Do. Salmon Rod—Seven day (valid all districts)	1	0	0
Do. Salmon Rod—Annual (valid district of issue only)	3	0	0
Do. Salmon Rod—Late Season (valid district of issue only)	2	0	0
Do. Salmon Rod—Foyle area extension (valid all districts)	2	10	0
Do. Salmon Rod—Foyle area extension (valid district of issue only)	1	10	0
On each—Draft net	4	0	0
Do. —Drift net	3	0	0
Do. —Bag net	10	0	0
Do. —Stake net	30	0	0
Do. —Head Weir	6	0	0
Do. —Box or Crib	10	0	0
Do. —Gap, Eye or Basket for Eels	2	0	0
Do. —Long line for Eels.	2	0	0

LICENCE DUTY ON OTHER ENGINES

Fishery District	Pole Net	Loop Net	Eel Trap	Special Local Licences	
				Rod	Draft Net
	£ s.	£ s.	£ s.	£ s.	£ s.
1. Dublin	2 0	—	—	—	—
2. Wexford	2 0	—	—	—	—
3. Waterford	2 0	—	—	—	—
4. Lismore	2 0	—	—	—	—
5. Cork	2 0	—	—	—	—
7. Kerry	2 0	—	—	—	—
8. Limerick	2 0	—	—	—	—
9. Galway	2 0	—	15 0	—	—
9[2]. Connemara	2 0	—	—	—	—
10[1]. Ballinakill	2 0	—	—	—	—
10[2]. Bangor	2 0	—	—	—	—
11. Ballina	2 0	—	—	—	—
12. Sligo	2 0	—	—	—	—
13. Ballyshannon	2 0	—	2 0	*3 0	*20 0
14[1]. Letterkenny	2 0	0 10	—	*3 0	†12 10 ‡20 0
17[1]. Drogheda	2 0	0 10	2 0	—	—
17[2]. Dundalk	2 0	—	—	—	—

‡River Lackagh Tidal Waters. *River Erne Tidal Waters.
†River Owenea Tidal Waters.

APPENDIX No. 19.

PUBLIC INQUIRIES HELD DURING THE YEAR 1959.

Date of Inquiry	Where Held	Subject Matter	Decision taken after consideration of Report of Inquiry
14th January, 1959	Listowel	Extension of prohibition on use of gaff as auxiliary to lawful angling on river Feale, its lakes and tributaries.	Extension of existing prohibition on use of gaff would not be warranted.
2nd June, 1959	Dublin	Modification of existing regulations governing the annual close season for capture of salmon and trout by nets in river Liffey.	Bye-law not made.
27th August, 1959	Clarenbridge	Application for oyster fishery order.	Matter under consideration.

APPENDIX No. 20.

ABSTRACT OF ORDERS, BYE-LAWS, ETC., MADE DURING THE YEAR 1959.

STATUTORY INSTRUMENTS.

Undersized Sea-Fish (Escallops) Order, 1959, dated 6th March, 1959 (S.I. No. 40 of 1959).

DECLARING that any Escallop measuring less than four and a half inches across its greatest width shall be undersized for the purposes of the Sea Fisheries (Protection of Immature Fish) Act, 1937.

Fishing Weir Operation (No. 3) Order, 1959, dated 22nd May, 1959 (S.I. No. 88 of 1959).

AUTHORISING the Electricity Supply Board to operate without a free gap the Cathaleen's Fall Weir on the River Erne at Ballyshannon, subject to certain conditions.

River Erne (Special Local Licences) (Amendment) Order, 1959, dated 22nd May, 1959 (S.I. No. 89 of 1959).

PRESCRIBING the rates of duty payable in respect of special local licences to fish the tidal waters of the River Erne.

River Erne (Fishing by Holders of Special Local Licences) Regulations 1959, dated 22nd May, 1959 (S.I. No. 90 of 1959).

PRESCRIBING the times and places for the use, by holders of special local licences, of draft nets in the tidal waters of the river Erne during 1959, subject to the conditions specified in the Regulations.

River Erne (Special Local Licence Duty) (Method of Payment) (Amendment) Order, 1959, dated 22nd May, 1959 (S.I. No. 91 of 1959).

SUSPENDING the operation of the River Erne (Special Local Licence Duty) (Method of Payment) Order, 1938, under which payment of special local licence duty might be effected by fixed instalments.

BYE-LAWS, ETC.

Revocation of Bye-Laws (Escallop Fisheries) Bye-Law No. 500, 1959, dated 6th March, 1959.

REVOKING Escallop Bye-Laws Nos. 457, 459, 470 and 499, thereby abolishing certain restrictions on the taking of Escallops in the areas covered by those bye-laws.

Ballyshannon District Netting Bye-Law No. 501, 1959, dated 22nd May, 1959.

SPECIFYING that in those portions of the tidal waters of the River Erne and Abbey River where salmon netting on a restricted basis is permitted in 1959 the following regulations shall apply:-

(*a*) no drift net may be used for fishing;

(*b*) no draft net of greater length than 85 yards may be used.

River Slaney (Angling) Bye-Law No. 502, 1959, dated 30th December, 1959.

PROHIBITING in each of the years 1960, 1961 and 1962 angling in which any lure other than artificial fly is used in the following portions of the River Slaney and in its tributaries flowing into those portions:—

(*a*) between Scarawalsh Bridge and Aghade Bridge from 1st April to the day immediately preceding the commencement in that year of the annual close season for angling for Salmon or Trout;

(*b*) upstream of Aghade Bridge from 1st May in each year to the day immediately preceding the commencement of the annual close season for angling for Salmon or Trout.

APPENDIX No. 21.

OUTPUT OF SALMON, SEA TROUT AND BROWN TROUT OVA AT THE VARIOUS HATCHERIES IN 1959

Hatchery	River system stocked	Output in thousand ova		
		Salmon	Sea trout	Brown trout
Inland Fisheries Trust Inc.	Various waters	265	—	400 imported
Inistioge ..	Nore and tributaries ..	80	—	—
Loughrea ..	Loughrea	—	—	60
Lismore ..	293,000 ova distributed to hatching stations throughout the State; remainder to Blackwater	311	—	—
Mallow ..	Awbeg, Bride, Caithre Finnow, Glen, Glyda.	490	—	—
Killarney ..	Killarney Lakes, Rivers Deenagh and Flesk	99	—	90
Carrigadrohid	Lee	117	—	—
Parteen ..	Shannon	587	—	—
Oughterard ..	Kilcolgan, Failimer	—	—	274
Lough Ennell	70,000 ova transferred to Inland Fisheries Trust Inc.; remainder to Lough Ennell.	—	—	180
Lough Owel	698,000 ova transferred to the Inland Fisheries Trust Inc.; remainder to Lough Owel.	—	—	910
Inver ..	Owengowla	—	38	—
Screebe ..	Screebe River	12	10	—
Ballisodare ..	Ballisodare	115	—	—
Ballyshannon	Erne	358	—	—
Glenties ..	842,000 salmon ova and all sea-trout ova distributed to hatching stations throughout the State; remainder to Rivers Owenea and Owentocker. ..	1,040	117	—
TOTALS ..		3,474	165	1,914

APPENDIX No. 22.

LIST OF SCIENTIFIC PAPERS, ETC., BY OFFICERS OF THE FISHERIES DIVISION PUBLISHED DURING THE YEAR 1959 (OTHER THAN THOSE APPENDED TO THIS REPORT).

TONER, E. D. "Predator and prey relationships." *Salmon and Trout Mag.* No. 156, May, 1959.

WENT, A. E. J. "Rare fishes taken in Irish waters in 1958." *Irish Nat. J.* XIII. No. 2. pp. 31-33.

———" Ireland's rare sea fishes." *Irish Nat. J.* XIII. No. 3. pp. 74-78.

APPENDIX No. 23.

SALMON OF THE RIVER ERNE

By

EILEEN TWOMEY, M.Sc., Fisheries Division,
Department of Lands, Dublin.

The Erne is 64 miles long and its catchment area and that of its tributaries cover approximately 1,690 square miles. The river, its catchment area and the geological substratum have been described by Went (1942). In 1946 work was commenced on the construction of two hydro-electric stations on this river, one at Cathaleen's Fall and one further upstream at Cliff. The station at Cathaleen's Fall was completed in 1953 and that at Cliff in 1955. A fish pass of the "White" submerged orifice type was constructed at both stations. The fish-pass extends from the tail race of the power station over the dam into the head waters. The pass at Cathaleen's Fall has 73 pools and the one at Cliff 35 pools. The passes are similar to those used by the North of Scotland Hydro-Electric Board at Pitlochry and Cluny Power Stations, (Jackson, 1955). A counter of the nylon screen type was put into operation at Cathaleen fish-pass in 1952. A daily reading of all fish passing through the counter is kept. The time of passage also of each fish through the counter is recorded, (Jackson, 1958).

Material and Methods.—The material upon which this paper is based consists of sets of scales taken from salmon captured from 1954 to 1959. As there was some discrepancy in the relationship between the number of fish sampled and the total run, allowance for this has been made by making suitable arithmetical adjustments. Up to 1957, the Electricity Supply Board were allowed to take 20% of the total run through the fish-pass. In 1958 all fishing was prohibited. It was resumed again in 1959, for a very short period (7 weeks). The restrictions in 1958 and 1959 were imposed as part of a programme to rehabilitate the stocks of fish in the river.

All fish examined were measured from the tip of the snout to the fork of the tail, and the weights were recorded to the nearest ounce. In 1954 weights were recorded for only a very small proportion of the fish, which were scaled.

Smolt Ages.—The distribution of the smolt ages is given in Table 1. In each age group and in each year under review, the two-year-old smolts were dominant. The next most important were the one-year-olds which varied from a maximum of 17·0% for the small spring fish in 1956 to a minimum of 3·9% in the small spring fish of 1957. The distribution of the smolt classes for all the age groups is given in Table 2. The one-year smolts varied from 16·2% in 1956 to 7·5% in 1954. Went (1942) got a much lower percentage for one-year smolts (4·8% in 1921, 1926 and 1927).

Smolts may be classified as Type A or Type B fish. If they show freshwater growth in the spring of the year in which they migrate they are described as Type B smolts, and those that show little or no growth are described as Type A smolts. The Type B smolts were the dominant type in the River Erne (Table 3).

Age Groups.—The salmon of the River Erne may be divided into five groups of maiden or unspawned fish, and a heterogeneous group of previously spawned fish. The small summer fish (2+winters) were dominant over the grilse (1+winters) by 0.4% in 1954, but in every other year grilse were dominant (Table 4). In the previous investigations carried out by Went (1942) the grilse was also the dominant age group. The percentage of previous spawners was low in 1954 and 1956 compared with the present and previous investigations carried out on this river. Went (1945), in his paper on "Previously spawned salmon in Ireland" records a figure of 15·4% for the Erne for the year 1944.

Except in 1957 when 57·4% of the total were taken in June, most fish were taken in July (Table 5). Spring fish were dominant in April and May each year with the summer fish next in importance. Except for June 1954, when the small summer fish were more numerous than grilse, grilse were dominant in June and July each year. Very few previous spawners were taken in April and May except in 1957 when over 30·0% of the total catch were previous spawners (Table 6).

Table 7 gives the years in which the fish were hatched and their years of return. In 1956, 1957 and 1958 the majority of the fish were progeny of the fry hatched three years earlier. In 1954 the catch was equally divided between the fry of three and four years earlier.

The size distribution is given in Table 8. Lengths between 25·59 and 33·95 inches were dominant in 1954. In 1956 and 1957 the dominant length groups were between 23·95 and 29·95 inches. The variation in the length groups can be attributed to the abundance of small summer fish in 1954 and in 1959 to the complete absence of scale material from early running fish.

In Table 9, the percentage composition by weight for 1956, 1957 and 1959 is given. Grilse were the most important age group from the commercial point of view. An estimate was made for 1954 which gave 64·9% small summer fish by weight and 17·3% grilse by weight.

The average condition coefficients or length weight relationships (calculated from the formula $K=10^5\ W/L^3\times 36$ where W=the weight in pounds and L the length in inches) are given in Table 10. The condition coefficient was lower on an average in 1957 than in 1956 and 1959. Spring fish had a higher value for K in 1956. Spring and summer fish were equal in 1957, and in 1959 the summer fish had a higher condition coefficient.

Previous spawners (with SM's) can be classified according to their absence habit. In 1954, 1956 and 1959 all the previous spawners returned to the river having spent less than a full year at sea (short absence). In 1957, however, a little over 50% of the previous spawners returned to the river after a long absence (a full year feeding in the sea between spawnings). No fish with a very long absence habit was recorded (Table 11).

The monthly percentage of fish having erosion in their scales, i.e. the phenomenon due to the absorption of the substance of the scales during ripening of the gonads is given in Table 12. As the season advanced, the percentage of fish having eroded scales increased in each age group. The percentage of erosion was highest in 1954 and lowest in 1959. The fact that the majority of fish taken in 1959 were net caught fish in the estuary would account for the very low percentage of erosion ; whereas in 1954 all the fish scaled were taken out of the fish catching pool in the fish-pass and it is possible they had experienced some delay in entering the pass.

The average weights and lengths for the different age groups are given in Table 13. The variation is only very slight, with the exception of 1959 when the average for previous spawners was below that of 1956 and 1957.

Resumé

(1) The two-year-old smolts formed almost 80% of the total in 1956 and over 80% in each of the other years under review (Tables 1 and 11).

(2) The two-year-old Type B smolts were the dominant smolt type (Table 3).

(3) Grilse were the most important age group except in 1954 when the small summer fish exceeded them by 0·4% (Table 4).

(4) Except for June 1957 the bulk of the fish were taken in July each year (Table 5). The bulk of the Spring fish were taken in April/May each year. Small summer fish and grilse were dominant in June and July, (Table 6).

(5) In each year 65% of the stocks and over relate to a single brood year except alone in 1954 when the stocks were divided almost equally between two brood years (Table 7).

(6) More than half the stocks had lengths between 22 and 30 inches (Table 8).

(7) Commercially in 1956, 1957 and 1959 the grilse were the most important age group (Table 9).

(8) The average condition coefficient for the most important age groups is given (Table 10).

(9) The majority of the fish exhibited the short "absence" habit (Table 11).

(10) In 1954, the percentage of fish with erosion of the scales was fairly high in each month, but in 1956, 1957 and 1959 the incidence of erosion was only slight (Table 12).

(11) The average weights and lengths of the different age groups were found to be uniform (Table 13).

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Jackson, P. A. (1953) "A Simple Type of Fish Counter." *Salmon and Trout Magazine* No. 138, May 1953.

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Went, Arthur E. J. (1942). "Salmon of the River Erne". (*Sci. Proc. R. Dublin Soc.*) Vol. 22 (N.S.) No. 49.

———— (1945). "Irish Previously Spawned Salmon". (*Sci. Proc. R. Dublin Soc.*) Vol. 24 (N.S.) No. 1.

Table 1.—Percentage of each smolt age in each age group (maiden fish only).

Smolt Class	Age Group in Winters					
	1+	2	2+	3	3+	Total
			1954			
1 ..	3·7	—	10·9	—	50·0	7·5
2 ..	85·9	100·0	87·1	100·0	50·0	86·9
3 ..	10·4	—	2·0	—	—	5·6
Total	100·0	100·0	100·0	100·0	100·0	100·0
Average age of smolts	2·07	2·0	1·91	2·00	1·50	1·98
			1956			
1 ..	16·8	17·0	7·3	—	—	16·4
2 ..	78·6	75·0	87·8	100·0	100·0	78·9
3 ..	4·6	8·0	4·9	—	—	4·7
Total	100·0	100·0	100·0	100·0	100·0	100·0
Average age of smolts	1·87	1·91	1·92	2·0	2·0	1·88
			1957			
1 ..	8·8	3·9	21·1	—	—	10·0
2 ..	88·6	96·1	78·9	—	—	84·9
3 ..	2·6	—	—	—	—	5·1
Total	100·0	100·0	100·0	—	—	100·0
Average age of smolts	1·94	1·97	1·79	—	—	1·95
			1959			
1 ..	9·5	14·3	30·6	100·0	—	11·1
2 ..	88·6	82·1	69·4	—	—	88·9
3 ..	1·9	3·6	—	—	—	2·0
Total	100·0	100·0	100·0	100·0	—	100·0
Average age of smolts	1·92	1·89	1·79	—	—	1·81

TABLE 2.—Percentage of each smolt class in each year.

Year	Smolt class			Average age of smolts
	1	2	3	
1954	7·5	86·9	5·6	1·98
1956	16·2	79·2	4·6	1·88
1957	9·4	88·4	2·2	1·95
1959	10·9	87·1	2·0	1·81

TABLE 3.—Estimated proportion (%) of the different smolt types in each smolt class (maiden fish only).

Year	1954		1956		1957		1959	
Smolt Age	Type A	Type B	Type A	Type B	Type A	Type B	Type A	Type B
One year	—	15·1	—	16·5	—	10·6	—	11·1
Two years	17·6	63·4	19·6	59·0	23·1	63·7	27·8	58·9
Three years	2·9	1·0	4·6	0·3	2·6	—	2·2	—
Total	20·5	79·5	24·2	75·8	25·7	74·3	30·0	70·0

TABLE 4.—Percentage of each age group in the catch of each year.

Year	1+	2	2+	3	3+	with SM's	Total
1954 ..	43·0	9·4	43·4	1·7	0·7	1·8	100·0
1956 ..	91·2	2·4	4·1	—	0·2	2·1	100.0
1957 ..	74·0	6·7	11·2	—	—	8·1	100·0
1959 ..	86·7	2·8	6·2	0·1	—	4·2	100·0

TABLE 5.—Estimated monthly catch in each age group as a percentage of the yearly catch.

Month	Age Group						
	1+	2	2+	3	3+	With SM's	Total
				1954			
April-May	—	5·6	4·1	1·4	—	—	11·1
June ..	11·8	3·4	17·6	0·3	0·3	—	33·4
July ..	29·8	0·4	18·3	—	0·4	1·5	50·4
August ..	1·4	—	3·4	—	—	0·3	5·1
Total	43·0	9·4	43·4	1·7	0·7	1·8	100·0
				1956			
April-May	2·2	2·4	2·7	—	—	—	7·3
June ..	31·1	—	1·1	—	0·2	0·2	32·6
July ..	52·8	—	—	—	—	1·9	54·7
August ..	5·1	—	0·3	—	—	—	5·4
Total	91·2	2·4	4·1	—	0·2	2·1	100·0
				1957			
April-May	0·3	3·6	2·1	—	—	2·6	8·6
June ..	46·6	2·2	6·4	—	—	2·2	57·4
July ..	23·9	0·9	2·7	—	—	3·3	30·8
August ..	3·2	—	—	—	—	—	3·2
Total ..	74·0	6·7	11·2	—	—	8·1	100·0
				1959			
June ..	19·6	1·6	3·0	0·1	—	0·2	24·5
July ..	67·1	1·2	3·2	—	—	4·0	75·5
Total ..	86·7	2·8	6·2	0·1	—	4·2	100·0

TABLE 6.—Estimated percentage of total of each age group in each month.

Month	Age Group						
	1+	2	2+	3	3+	With S.M.'s	Total
				1954			
April–May	—	59·5	9·4	82·3	—	—	11·1
June ..	27·4	36·1	40·6	17·7	42·8	—	33·4
July ..	69·3	4·4	42·2	—	57·2	83·3	50·4
August ..	3·3	—	7·8	—	—	16·7	5·1
Total	100·0	100·0	100·0	100·0	100·0	100·0	100·0
				1956			
April–May	2·4	100·0	65·8	—	—	—	7·3
June ..	34·1	—	26·8	—	100·0	9·5	32·6
July ..	57·9	—	—	—	—	90·5	54·7
August ..	5·6	—	7·4	—	—	—	5·4
Total	100·0	100·0	100·0	—	100·0	100·0	100·0
				1957			
April–May	0·4	53·7	18·7	—	—	32·1	8·6
June ..	64·6	32·9	56·1	—	—	27·2	57·4
July ..	32·3	13·4	25·2	—	—	40·7	30·8
August ..	2·7	—	—	—	—	—	3·2
Total	100·0	100·0	100·0	—	—	100·0	100·0
				1959			
April–May	—	—	—	—	—	—	—
June ..	21·4	57·1	48·7	100·0	—	4·7	24·5
July ..	78·6	42·9	51·3	—	—	95·3	75·5
August ..	—	—	—	—	—	—	—
Total	100·0	100·0	100·0	100·0	—	100·0	100·0

TABLE 7.—Proportion of the different brood-years in the catch of the different years.

Brood year	Returned in			
	1954	1956	1957	1959
1949	1·4	—	—	—
1950	47·8	—	—	—
1951	46·3	1·3	1·4	—
1952	4·5	11·0	2·7	—
1953	—	72·2	24·0	—
1954	—	15·5	65·6	0·5
1955	—	—	6·3	12·2
1956	—	—	—	89·0
1957	—	—	—	8·3
Total	100·0	100·0	100·0	100·0

TABLE 8.—Estimated size distribution as a percentage of the total catch in the different years.

Class interval (inches) *	Year			
	1954	1956	1957	1959
18				0·5
20	0·6	1·9	0·9	6·7
22	12·9	3·7	14·0	32·3
24	21·3	22·4	36·4	38·3
26	7·4	36·7	14·9	10·5
28	6·1	23·5	2·5	5·1
30	22·3	27·3	20·9	4·5
32	15·2	2·1	5·2	1·2
34	8·5	1·4	2·7	0·7
36	3·9	—	2·5	—
38	1·5	1·0	—	—
40	0·3	—	—	0·2
Total	100·0	100·0	100·0	100·0

* Class interval 18, etc. include fish with lengths between 17·95 and 19·95 inches

TABLE 9.—Percentage composition by weight in 1956, 1957 and 1959.

Year	Age Group in Winters						
	1+	2	2+	3	3+	With S.M.'s	Total
1956 ..	81·4	5·1	7·4	—	1·5	4·6	100·0
1957 ..	61·5	1·2	20·8	—	—	16·5	100·0
1959 ..	79·6	4·3	10·8	0·4	—	4·9	100·0

TABLE 10.—Average condition coefficient (K) in the more important age groups in 1956, 1957 and 1959.

Age Group	Year		
	1956	1957	1959
1+	1·01	1·02	1·15
2	1·04	0·98	1·01
2+	1·07	0·95	1·12
with S.M.'s ..	1·03	1·01	1·08
Spring Fish	1·04	1·01	1·01
Summer Fish ..	1·01	1·01	1·13

TABLE 11.—Absence habit of previous spawners (expressed as a percentage).

Absence habit	Year			
	1954	1956	1957	1959
Short	100·0	100·0	46·7	100·0
Long	—	—	53·3	—
Very long	—	—	—	—
Total ..	100·0	100·0	100·0	100·0

TABLE 12.—Percentage of fish in the different months' catch showing erosion on their scales (maiden fish only).

Month	1	2	1954 2+	1954 3	3+	Total
April-May ..	—	0·0	14·0	—	—	12·5
June	2·0	40·0	23·0	0·0	100·0	15·6
July	6·0	100·0	52·0	—	100·0	25·7
August	100·0	100·0	78·0	—	—	86·6
Total	6·7	81·8	33·3	0·0	100·0	23·3
			1956			
May	—	0·0	0·0	—	—	0·0
June	0·0	—	0·0	—	0·0	0·0
July	5·2	—	0·0	—	—	5·2
August	54·1	—	0·0	—	—	58·3
Total ..	8·3	0·0	0·0	—	0·0	6·8
			1957			
April-May ..	0·0	0·0	12·5	—	—	6·9
June	0·0	0·0	0·0	—	—	0·0
July	17·2	50·0	25·0	—	—	20·0
August	45·0	—	—	—	—	45·0
Total	10·1	6·2	11·1	—	—	11·1
			1959			
June	0·0	31·5	2·7	0·0	—	2·4
July	0·0	66·6	18·7	—	—	1·5
Total	0·0	37·0	7·5	—	—	2·0

TABLE 13.—Average weights and lengths of the different age groups in 1956, 1957 and 1959.

Age Group	Year					
	1956		1957		1959	
	L	W	L	W	L	W
1+	24·4	5·3	24·5	5·5	24·0	5·8
2	29·6	10·5	30·8	10·4	29·6	9·5
2+	29·1	9·8	31·8	11·2	29·9	11·0
with 5 ins.	30·0	10·7	30·9	10·9	26·6	7·5

L—length in inches. W—weight in pounds.

APPENDIX No. 24.

PASSAGE OF SMOLTS THROUGH TURBINES—EXPERIMENTS WITH BALSA WOOD BOXES AND FISH SHAPES AT RIVER ERNE HYDRO-ELECTRIC STATION IN MAY, 1959.

By

C. J. McGRATH, B.E., AND MISS E. TWOMEY, M.Sc.,
Fisheries Division, Department of Lands, Dublin.

A series of experiments in connection with the above and in continuation of those initiated in May 1958 was carried out at Cliff Power Station and Cathaleen's Fall Power Station on the 12th and 13th May, 1959.

The experiments were conducted by the engineers and biologists of Fisheries Division with the co-operation and assistance of the staff of the Electricity Supply Board, in accordance with the system devised and practised by Dr. Carlin and Dr. Monten of Sweden.

According to the data published by the Electricity Supply Board there are two generating sets at Cliff Power Station having an average yearly head of 10 m. The turbines are of the Kaplan type and at this head are capable of producing 10 m.w. each.

There are likewise two generating sets at Cathaleen's Fall Power Station where the average yearly head is 28·5 m. The turbines here are also of the Kaplan type and capable of producing 22·5 m.w. each at this head.

Each test consisted of passing a number of units through a turbine operating at a pre-selected load and under a known head.

The units were introduced into the turbines by dropping them down the intake gate slots and thereafter recovered from the tail race below the power station.

The units consisted of hollow boxes and of solid fish shapes both made of balsa wood. Live smolts could be placed in the boxes and held there and in this way passed through the turbine and subsequently recovered.

Boxes and fish shapes of various lengths, as follows, 5½″; 6″; 6½″; 7″; 8″, were selected to cover the range of smolt sizes in the Erne determined by a size—frequency analysis of a large number of smolts from the river.

In the case of the boxes the dimensions given are internal lengths, and in the case of the fish shapes, the overall lengths.

The units were manufactured by the laboratory staff of Fisheries Division. The boxes were made with a recess in the bottom which was filled with lead shot to make the boxes sink. The shot was held in place by gumming a thin sheet of newspaper over the opening. After a short period in the water the paper softened and came apart releasing the shot and the box came to the surface. The release of the shot was expedited by perforating the paper covering immediately before use.

A recess was cut into the solid balsa wood of the fish shapes which also was filled with lead shot similarly held in position with a thin sheet of newspaper pasted over the opening.

At the start of the experiments it was discovered that there was insufficient shot in these fish shape recesses to overcome buoyancy. Additional ballast was provided by filling standard fish scale envelopes with the extra shot required which were then swathed around the tail of the fish shape and gummed to it.

Typical Low; Medium and Full generating load conditions at Power Stations were 4; 7 and 11 m.w. in the case of Cliff Power Station and 5; 11 and 22 m.w. in the case of Cathaleen's Fall Power Station. It was decided, accordingly, to carry out the tests at each Station at these particular loadings.

At the commencement of the tests both boxes and fish shapes of the complete range of sizes made up were employed in each test. Towards the end of the test fish shapes only were employed as there was some evidence that the box shape was introducing an additional hazard into the test.

Tests with boxes having live smolts inside them were carried out at Cliff Power Station but no such tests were carried out at Cathaleen's Fall, because of the hazardous nature of the tail race site which made recovery operations exceedingly difficult and dangerous.

Whenever live smolts were passed through the turbines, the same number were placed in balsa wood boxes and held for the duration of the experiment in a floating cage anchored in the fish-pass together with a similar number of free swimming smolts. These acted as a control on the experiment.

Five smolts, passed through the turbines in this way and subsequently recovered, showed no superficial signs of ill-effects or injury on recovery. They were removed from the boxes and placed in a separate floating cage and held there for 48 hours by which time two had died. Of the control smolts none had died in the same period.

A somewhat similar experience occurred in 1958 and it is possible that death was due to injury resulting from handling the fish when placing them in the boxes rather than to the effect of passing through the turbine. It was noted that when the smolts were removed from the vessel in which they were held before being placed in the boxes, considerable numbers of scales were seen to remain in the vessel. If the mortality which occurred could be attributed to this cause, then in so far as it could be possible to come to a conclusion in view of the small numbers engaged in this particular aspect of the experiment, it would appear that at heads of 12·9 m. and 13 m. and at station discharges represented by 7 m.w. and 4 m.w., smolts suffer no injury in passing through the turbines at Cliff, due to pressure or like factors obtaining under these conditions. It may be desirable in future to anaesthetise the fish before placing them in the boxes to prevent injury while doing so.

The possibility of injury due to collision with the machinery has been considered in the light of evidence obtained of serious damage

to the units that passed through the turbines and were subsequently recovered below the dam.

At first it was decided to regard units that had not been recovered and of which there was no trace as having been smashed. Subsequently it was reported from Ballyshannon that, in annual maintenance operations at these power stations subsequent to the carrying out of the tests, units were recovered intact which had already been deemed to be destroyed for the reasons stated above. In view of this it was decided to take account only of units about which full information was available as to their fate. The acceptance of this viewpoint was encouraged by the recollection of the smallness of the broken particles which it had been found possible to recover and which invariably could be traced to their original unit so that it was felt that if the boxes unaccounted for had been destroyed, as was at first believed, some evidence to this effect would have been forthcoming to support this belief.

The data collected in the course of the experiment and tabulated has been broken down, analysed and summarised on this assumption and is set out in the table below.

Date	Power Station	Type of Unit	Head in Metres	Station Load	No. of Units Recovered	No. Smashed	No. Intact or Slightly Damaged	% Recovery Intact or Slightly Damaged
12/5/59	Cliff	Box	12·7	11 m.w.	7	—	7	100%
do.	do.	Fish Shape	12·7	11 m.w.	4	—	4	100%
do.	do.	Box	12·8	7 m.w.	6	—	6	100%
do.	do.	Fish Shape	12·8	7 m.w.	2	—	2	100%
do.	do.	Box with Smolt	12·9	7 m.w.	5	—	5	100%
do.	do.	Box	12·9	4 m.w.	5	1	4	80%
do.	do.	Fish Shape	13·0	4 m.w.	1	—	1	100%
do.	do.	Box with Smolt	13·0	4 m.w.	3	1	2	66⅔%
do.	Cathaleens Falls	Fish Shape	31·0	15 m.w.	10	2	8	80%
do.	do.	Box	31·0	15 m.w.	5	2	3	60%
13/5/59	Cliff	Fish Shape	12·8	11 m.w.	10	—	10	100%
do.	do.	Fish Shape	12·9	7 m.w.	12	1	11	91·7%
do.	do.	Fish Shape	13·0	4 m.w.	8	—	8	100%
do.	Cathaleens Falls	Fish Shape	29·2	22 m.w.	11	—	11	100%
do.	do.	Fish Shape	29·2	11 m.w.	11	—	11	100%
do.	do.	Fish Shape	29·3	5 m.w.	13	1	12	92·3%

If the assumptions already made are valid, then, on the basis of the results above, the possibility of danger for smolts passing through turbines of the type and under the conditions investigated would appear to be principally at low discharges. The problem may perhaps be even less than as suggested by the results having regard to the fact that in the tests, rigid units are employed to represent a living flexible fish. Furthermore, it was stated by Electricity Supply Board representatives in the course of the tests, that running at such low loads is discouraged. In addition, it is possible that under such turbine discharges, the attraction of the inflow for smolts is very much less than at greater discharges.

It is hoped to extend the investigations to other Hydro Electric Stations so that the effects of varying head and different sizes of turbines on the passage of the experimental units can be ascertained and the results documented and compared.

APPENDIX No. 25.

PREDATION BY PIKE (ESOX LUCIUS L.) IN THREE IRISH LAKES.

By

E. D. Toner, M.Sc., Fisheries Division, Department of Lands, and Inland Fisheries Trust, Dublin.

Note.—*Bibliographical references are denoted by numbers in parenthesis in the text.*

In recent years attention has been concentrated towards the fullest possible development of the trout fisheries by the Inland Fisheries Trust, Inc., a body which was set up especially for this purpose in 1951.

The predatory habits of the pike, a fish which was evidently introduced into this country (1), have always been known seriously to reduce trout and salmon stocks here, and there is ample evidence to show that drastic thinning out of pike stocks gives such a vastly increased survival rate of trout that the trout angling improves with surprising speed (2). Intensive killing of pike has, therefore, been the main tool used in developing our trout fisheries and it was considered desirable to estimate, however approximately, the amount of damage these fish were responsible for in order to explain the speedy improvement of pike-infested trout waters.

1.

1,439 pike taken from Lough Mask in County Mayo were the subject of special study. They were captured during the period July, 1954—April, 1955; they were individually weighed and measured and the vertebrate food remains in their guts were noted.

When trout remains were found, an estimate was made of what their live weights had been. These were considered to be sufficiently reliable for the purpose of this assessment, as they were made by men with long experience of handling fish. A figure for the average daily fish-food intake of young pike was published by Scholz in 1932 (3); this was expressed as a percentage of the body weight of the pike and ranged from 3% to 5% for fish of from one to two years of age. In order to err on the conservative side, a figure of 3·5% was chosen for this work.

The Lough Mask pike were weight-grouped and approximately aged by using Austin's age/weight curve (4). (Subsequent scale and opercular bone readings have shown that this curve gives an underestimate of the weight for age of Lough Mask fish; they are, in fact, far faster growing than is indicated by the curve; their annual weight increments should, therefore, be greater than those given here. In a later estimate this and other admitted defects in the present one will be remedied.) The average weights of these age classes were then found and an annual weight increment was calculated. At this stage sixteen

fish were excluded from the calculation as they were three years of age and under and therefore may not have been entirely piscivorous in habit (5).

Using the daily food intake figure and the annual weight increment a total annual consumption of 47 lb. was worked out for one pike of an age class, the average weight of which was 4·6 lb. This reduces to a daily food ration of only two ounces, which is a very modest allowance for a fast growing fish like the pike. There were two hundred and forty five individuals in this age class whose calculated fish consumption thus came to 11,564 lb. Treating the other groups in the same way, a final figure was obtained of 171,174 lb. of fish eaten in the year before these pike were removed from the lake.

In order to find what part of this weight consisted of trout, the estimated live weights of the individual trout remains found in the pike stomachs were used to obtain a trout/coarse fish weight ratio. A further number of 1,790 pike were especially examined for this purpose, and the ratio, i.e. the total weight of trout/the total weight of other fish, mainly perch and other pike, came to 5·3 parts of trout to one of coarse fish. Frogs (ten), char (three), salmon parr (one) and unidentified fish remains had to be left out of the calculation. The trout out-numbered the coarse fish found in the stomachs and ranged in (estimated) individual weight from 0·25—4·5 lb. The individual average weight of the eaten coarse fish was only 0·25 lb. By using this ratio the total weight of mixed fish calculated as having been destroyed, i.e. 171,174 lb., was reduced to 144,004 lb. of trout and 27,170 lb. of coarse fish.

The proportion in which the different weight groups of trout occurred in the pike stomachs was again used, this time to break down the total calculated mass of trout eaten into its constituent weight-classes and thence into its constituent age groups. For example, 108 trout of the 0·25 lb. class were found, 61 of the 0·5 lb. class, 9 of the 0·75 lb. class and so on, so the total calculated weight of trout was taken to be made up of these weight classes in those proportions. In this way an approximate age/weight grouping was arrived at as follows :

Age group (years)	2	3	4	5	6	7
Total calculated wt. (lb.) in each age group	54,309	49,257	13,893	16,419	3,789	6,315

TOTAL WEIGHT 143,982 lb.

It can be safely taken that Lough Mask trout attain sexual maturity at the age of four years, so that the weight of would-be spawners eaten is the total of all those fish of four years and upwards. This comes to 40,416 lb. If half of this weight consisted of female fish, which might have produced 800 ova to the pound of body weight, then the 1,423 pike can be said to have been responsible for the destruction of about 16,166,400 potential trout ova in one year.

Similar work was carried out on a group of 1,171 pike from a neighbouring lake, Lough Corrib, in County Galway. The figure for trout eaten came to 103,667 lb. in one year, but as there was a greater proportion of mature fish in the Corrib pike stomachs, the total calculated destruction of ova was 32,950,400. The amounts of trout estimated as having been eaten in both of these waters appear to be of the right order when compared with figures obtained by other workers for both bird and fish predators (6), (7) and (8). Davies (7) has shown that the combined penguin, cormorant and gannet populations of the West coast of the Union of South Africa destroy annually about eighty nine thousand tons of marine fish and Foerster and Ricker (8) have demonstrated a more than trebled survival rate of young sockeye salmon as a result of persistent netting of predaceous fish in Cultus lake in British Columbia. "In absolute figures", they say, "this (the increased survival rate) represents 3,800,000 migrants saved. . . ." The same workers have estimated that their predator control experimental work could be expected to yield an adult sockeye run valued at 95,000 dollars.

II.

While these estimates were being made, further investigation of the pike's food was concurrently being carried on. Data for well over 100,000 fish have now been collected from waters all over the country but only those for three lakes are dealt with here. These waters are the two already treated of, and another, also in County Mayo, is included. A total number of 10,572 pike were caught in these lakes during the periods shown below.

Lake	Fishing period	Nos.	Weight (lb.)
Lough Conn	Feb. 1956—Dec. 1958 (36 months)	2,246	13,308
Lough Mask	Aug., 1955—Dec. 1958 (41 months)	2,886	20,584
Lough Corrib	Jan., 1954—Dec. 1958. (60 months)	5,440	15,835
	Totals	10,572	49,727

The total number of fish which had empty stomachs was 8,357 or 79·0%; the remainder, 2,215 or 21·0%, whose stomachs contained food remains will be referred to subsequently as "feeding fish." This is, of course, a misnomer, as very many of the fish may have had meals inside them on being captured but regurgitated them while struggling in the gill nets or on the set live-baited lines which were serviced only once daily. The term is used only for convenience.

Table 1.—shows the numbers of feeding pike for each lake and the type of food found in their guts. It will be seen that many fish fed on

a mixture of different species but that the majority had eaten either salmonids or perch exclusively. Considering each lake separately it is clear that the salmonid group of fishes bore the main impact of the pike's attack.

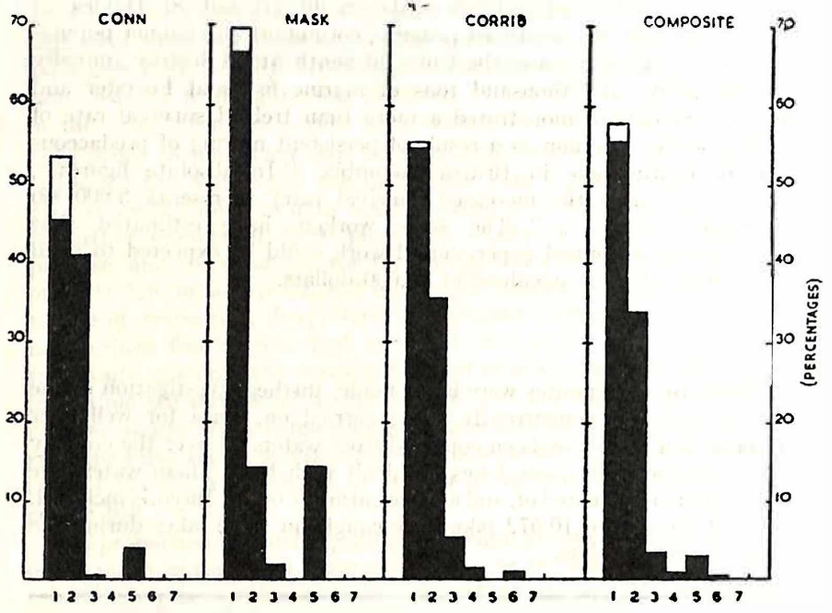

FIG. 1.

On *Lough Conn* 58·3% of the pike were feeding exclusively on salmonids, and perch were next in importance; 35·8% of all the pike had only these fish in their stomachs. The numbers feeding on other species and mixtures of species were unimportant.

Lough Mask was similar except that the degree of predation on the salmonids was much greater than in either of the other two lakes. 67·2% of the feeding pike were found to be preying on this group exclusively.

Lough Corrib.—Here the perch bore more of the brunt of predation than in either of the other lakes but the greater number of pike were still feeding on the salmonids, 54·2% as compared with 34·3% preying on perch.

In Table 2, the actual numbers of the different species found in the pike stomachs are given and the degree of predation on the salmonidae is shown even more clearly. In this table only recognisable vertebrate food remains are shown; shrimps and unidentified fish remains (U.F.R. on Table 1) have been left out. The numbers of salmonids are expressed as percentages of the whole number of vertebrate organisms found in the stomachs. The figures are shown graphically in Figure 1 for each lake. (Legend thus :—1—Salmonidae; 2—Perch; 3—Pike; 4—Eels; 5—Frogs; 6—Rudd; 7—Sticklebacks). The fourth histogram is included to give an overall view of the predation picture. The white tops on the salmonid columns indicate the percentages of young salmon and char which made up the total. It is obvious that the brown trout suffers most from the attacks of the pike. Salmon may suffer more than is shown as relatively little efficient netting for pike was carried out at the time of year when salmon smolts would be available to the predator. These findings support the belief that the estimates of trout consumption described earlier are of the right magnitude and that, if anything, they represent minimum figures.

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TABLE 1.

	S.	P.	PT.	F.	Pk.	E.	CP.	TPk.	R.	Ga.	TF.	TSh.	PP.	UFR.	Sh.	Nos. of pike with Food
Loch Conn	272	167	13	7	4	2	1	—	—	—	—	—	—	—	—	466
%	58·3	35·8	2·7	1·2	0·8	—	—	—	—	—	—	—	—	—	—	100·0
Loch Mask	309	62	2	52	6	—	—	1	—	—	—	—	—	29	—	461
%	67·2	13·4	—	11·2	1·3	—	—	—	—	—	—	—	—	6·2	—	100·0
Loch Corrib ..	609	442	8	—	77	19	—	1	13	1	1	1	1	3	22	1,288
%	54·2	34·3	—	—	5·9	1·4	—	—	1·0	—	—	—	—	—	1·7	100·0
Totals	1,280	671	23	59	87	21	1	2	13	1	1	1	1	32	22	2,215
%	57·7	30·2	1·0	2·6	3·9	—	—	—	—	—	—	—	—	1·4	—	100·0

S.—Salmonidae; P.—Perch; PT.—Perch and Trout; F.—Frogs; Pk.—Pike; E.—Eels; CP.—Char and Perch; TPk.—Trout and Pike; R.—Rudd; Ga.—Sticklebacks; TF.—Trout and Frogs; TSh.—Trout and Shrimps; PP.—Pike and Perch; UFR.—Unidentified Fish Remains, Sh.—Shrimps.

TABLE 2.

	TOTAL NUMBERS OF:—										
								vertebrates eaten	pike examined, (*a*); with food, (*b*)		empty stomachs
	S.	P.	Pk.	E.	F.	R.	Ga.		(*a*)	(*b*)	
Loch Conn	323	268	4	2	7	—	—	602	2,246	466	1,780
%	53·6	41·1	0·6	—	1·1	—	—	100·0	100·0	20·7	79·3
Loch Mask	329	68	8	—	68	—	—	473	2,886	432	2,454
%	69·5	14·4	1·7	—	14·4	—	—	100·0	100·0	14·9	85·1
Loch Corrib	788	511	78	20	—	15	1	1,415	5,440	1,263	4,177
%	55·6	36·1	5·6	1·4	—	1·0	—	100·0	100·0	23·1	76·9
Totals	1,440	847	91	22	74	15	1	2,490	10,572	2,161	8,411
%	57·8	34·0	3·6	0·9	2·9	0·6	—	100·0	100·0	20·4	79·6

S.—Salmonidae; P.—Perch; Pk.—Pike; E.—Eels; F.—Frogs; R.—Rudd; Ga.—Sticklebacks;

APPENDIX No. 26.

HERRING INVESTIGATIONS ON THE SOUTH AND EAST COASTS OF IRELAND 1959/60

By

JOHN BRACKEN, B.Sc., Fisheries Division,
Department of Lands, Dublin.

Adult samples from Dunmore East, Clogherhead, Rosslare, Ballycotton, Youghal, Kinsale, Schull, Bantry and Castletownbere were examined. Whitebait were sampled from the so-called " sprat-weirs " in Waterford Harbour and the estuary of the Blackwater. In addition a survey for clupeoid larvae was undertaken in April and May 1960 in these same waters using a 1 metre stramin net.

1. *The Dunmore East Herring Fishery* 1959/60

Fishing commenced on October 27th, 1959, and finished on February 13th, 1960. Ninety-five Irish based boats attended the fishery and landings were made by three types of gear on 68 days out of a possible 86. 59,463 crans were landed by Irish based boats during the season, an increase of 13,350 crans over that of 1958/59 (29% approximately). Ring nets caught 34,751 crans, the remainder being taken by vinge trawls and 2 purse-seines. As in previous years up to the end of January the ring nets landed the major portion of the catch. After Christmas the landings by vinge trawls increased so that they predominated by the end of the season. Samples of herrings were obtained from October 29th to December 22nd and from January 5th to February 7th. These samples were examined for length, sex, maturity and age. Fish numbering 1,423 were examined in this way and a further 5,655 were measured. Table 1 summarizes the age/length analysis and the number of fish measured each month during the season.

TABLE 1.

Age-Length Composition and Measured Total

Age in years No. of Rings	2 1	3 2	4 3	5 4	6 5	7 6	8 7	9 8	10 9	10+ 10	Totals	Measured Totals
October ..	—	36	19	18	9	5	1	—	—	—	88	398
November ..	—	123	42	76	57	37	24	6	3	5	373	1,234
December ..	12	132	38	78	32	20	19	1	—	1	333	1,209
January ..	7	101	11	124	44	38	77	18	8	3	431	1,587
February	4	61	3	40	22	14	37	13	3	1	198	1,228
Totals ..	23	453	113	336	164	114	153	38	14	10	1,423	5,655

The dominant age groups were found to be 3 and 5 year olds. The maturity stages were similar to those of the 1958/59 season. In October, November and December the gonads were developing (mainly stage V), becoming full (stage VI) in January. During February a small percentage of spents showed up in the catches. On February 13th fishing ended due to inclement weather and when the boats resumed fishing afterwards the shoals could not be located.

The shoals were first located N.W. of the Saltee Islands, close to the shore, in 10 fathoms. By mid-November these fish had reached Slade's Point, 2 miles N.E. of the Hook Light in 10/14 fathoms. Simultaneously fish were located in the Waterford Harbour inside the Hook and heavy landings were made here up to Christmas. No fishing took place in the Harbour during the 1958/59 season. After Christmas, fishing was again confined mainly to Baginbun Bay (Figure 1B.) some light landings were made off Brownstown Head in early January. In late January, small landings were made well to the west off Ballycotton (Figure 2). At the close of the fishery in mid-February the shoals were located off the Keraghs in Ballyteige Bay in 8/10 fathoms (Figure 1).

During the 1958/59 season fishing tended to be restricted to the area west of the Hook before Christmas and heavy landings were made within 12 miles of the Hook itself. After Christmas Irish boats made all their catches East of the Hook comparatively close inshore.

2. *Adult Sampling from Other Areas.*

Samples of herrings from Clogherhead, Rosslare, Ballycotton, Youghal, Kinsale, Schull, Bantry and Castletownbere (Figure 2) were examined with a view to delimiting the extent of the Dunmore stock—a link between the recruit age groups in the Irish Sea and those at Dunmore has been suggested. The Clogherhead samples, taken in Dundrum Bay in February 1960, showed characteristics which could not be associated with other stocks examined. They had a higher vertebral count (mean 57.78) than the Dunmore herrings (mean 56·9). The suggestion is that these herrings taken in Dundrum Bay (Figure 2) are a localised race.

As samples from the other areas, particularly from County Cork, were only obtained spasmodically they were of little value apart from determining that most of the fish examined were spents or potential winter spawners. Large numbers of developing virgins were observed in the Bantry, Castletownbere and Kinsale samples indicating that these areas are spawning and nursery grounds.

3. " *Sprat-Weir* " *Data*

Small samples of adult and immature herrings were obtained from sprat-weirs at Passage East and Cheekpoint (on Waterford Harbour) and Ballynatray (Blackwater estuary) from November, 1959, to April, 1960. The adults sampled from the Passage East weir differed, as regards maturities and age/length composition, from those examined

at Dunmore East during the same period. Herrings from the "whitebait" samples from Waterford Harbour had a mean vertebral count of 57·7 and from the Blackwater estuary of 57·4. This would seem to indicate that these young herrings are not part of the main Dunmore stock.

4. *Larval Survey in the Waterford Harbour and the Blackwater Estuary.*

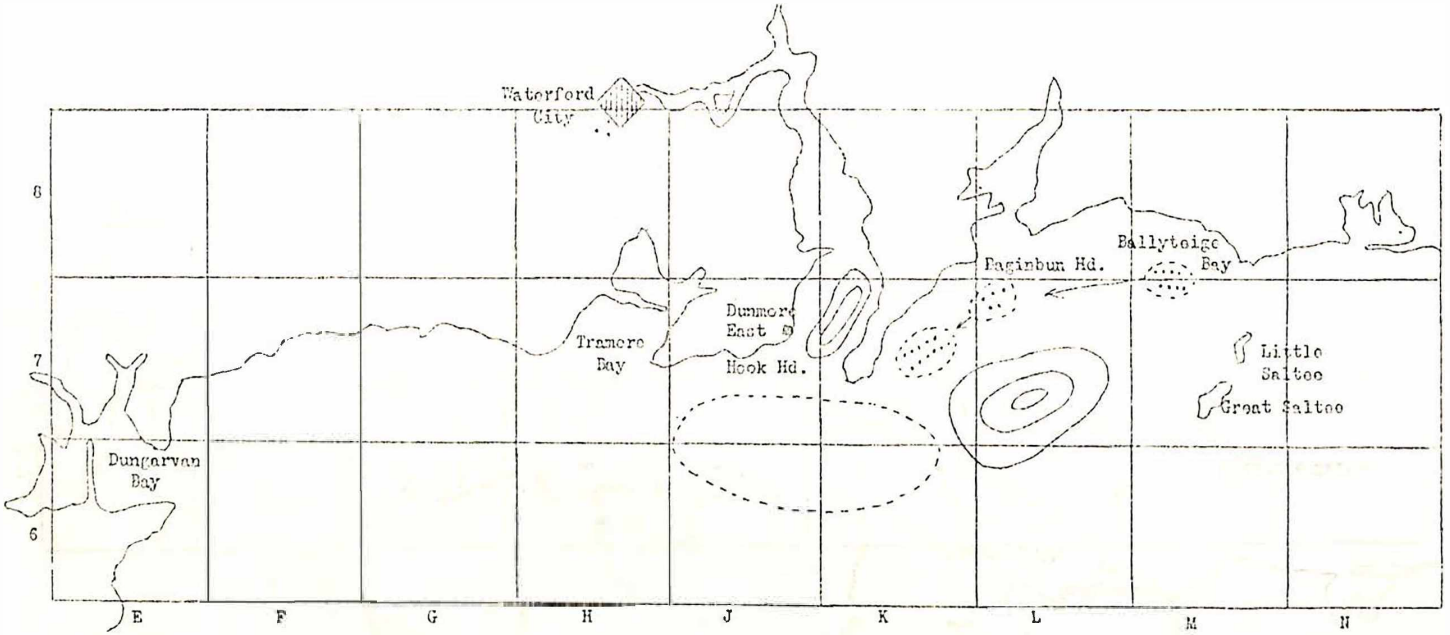
Clupeoid larvae were taken in a 1 metre stramin net in Waterford Harbour from April 28th to May 6th, 1960. Thirty-seven stations extending from the open sea, off Dunmore East to fourteen miles inland (Figure 3) were chosen.

C. sprattus larvae, ranging from 10/19 mm. showed a widespread distribution in the Harbour.

C. pilchardus larvae, ranging from 30/40 mm. were taken in high numbers at several stations. The distribution of *C. harengus* larvae was sporadic and confined to the sampling area between Passage East and Cheekpoint.

Eight stations in the Blackwater estuary sampled on April 10th and 20th yielded two Clupeoid larvae. Both were *C. sprattus* (Figure 3).

LOCATION OF HERRING FISHERY



Period = October - November - December 1959

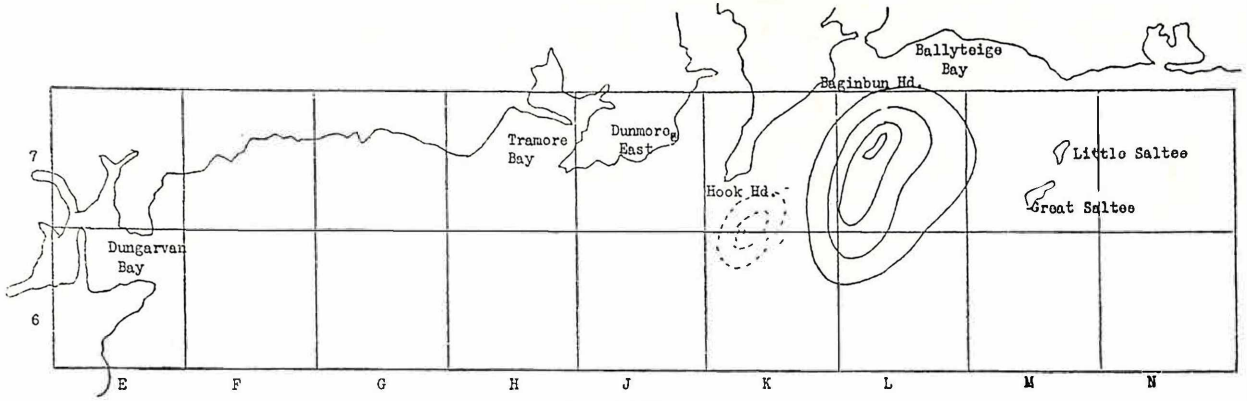
Denotes heavy fishing

Denotes light fishing

Denotes early landings in October.

Figure 1 A.

LOCATION OF HERRING FISHERY



Period = January - February 1960

Denotes heavy fishing

Denotes light fishing in October

Figure 1 B.

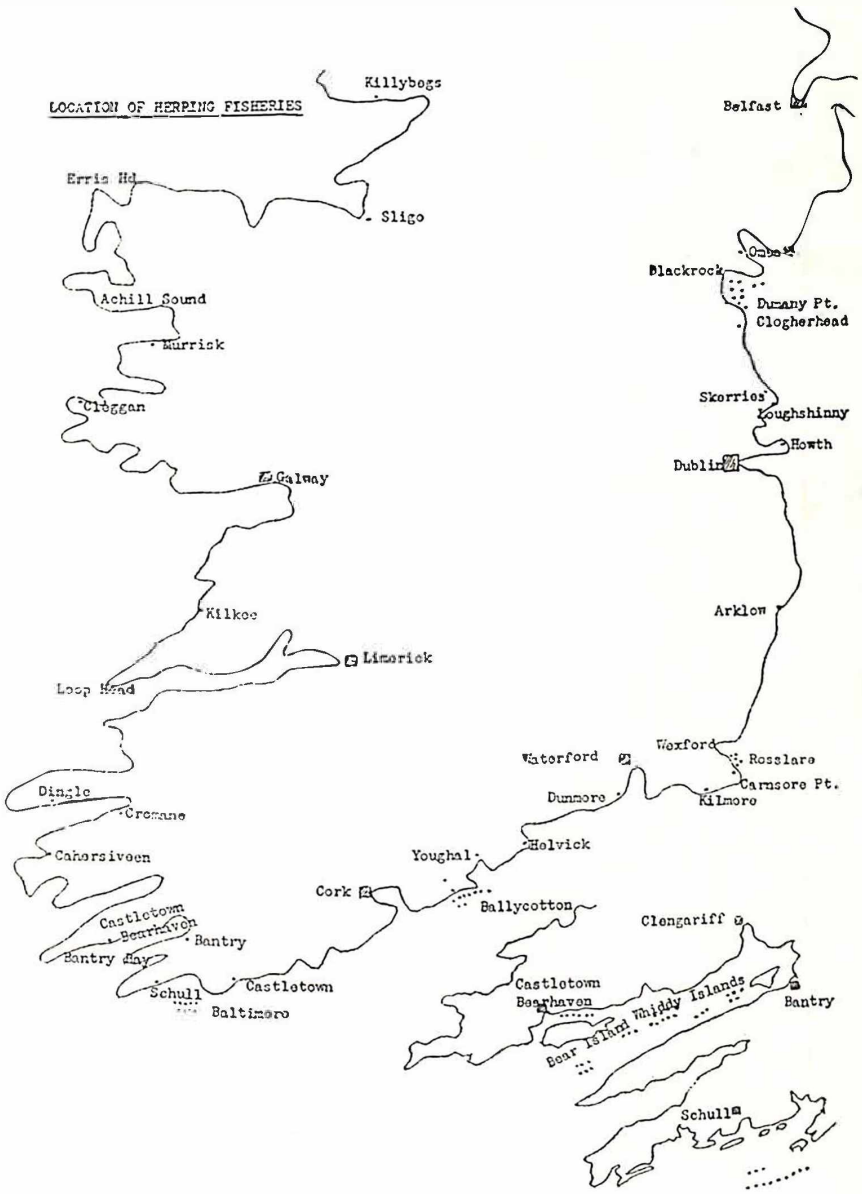

LOCATION OF HERRING FISHERIES
Killybegs
Erris Hd.
Sligo
Achill Sound
Murrisk
Cleggan
Galway
Kilkee
Limerick
Loop Head
Dingle
Cromane
Cahersiveen
Castletown Bearhaven
Bantry
Bantry Bay
Schull
Castletown
Baltimore
Cork
Youghal
Ballycotton
Waterford
Dunmore
Helvick
Wexford
Rosslare
Carnsore Pt.
Kilmore
Arklow
Howth
Dublin
Skerries
Loughshinny
Dunany Pt.
Clogherhead
Blackrock
Belfast
Clongariff
Castletown Bearhaven
Whiddy Islands
Bantry
Bear Island
Schull

Figure 2.

LOCATION OF SPRAT WEIRS

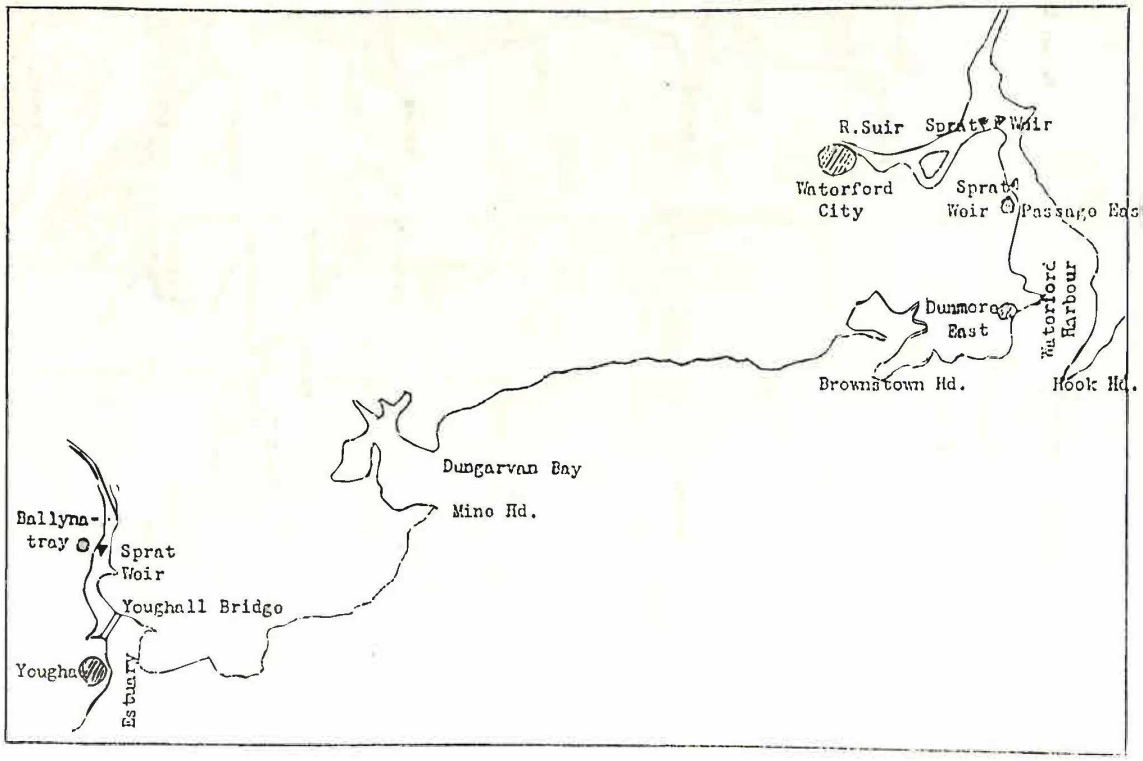


Figure 3.